German Listed Companies' Choice of GAAP

Imad Ali Alsuwaih

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University of Newcastle upon Tyne Business School
(Accounting and Finance)
University of Newcastle

To my parents,
my wife 'Hajer'
and my daughter 'HibataAllah'

Abstract

German listed firms have been allowed by law some choice of a set of Generally Accepted Accounting Standards (GAAP) in the preparation of their consolidated accounts since 1998. This thesis examines the relationship between non-financial German firms' specific characteristics and their choice of GAAP in the financial year ending 2001 using data obtained from Hoppenstedt`s Aktienführer. The study is conducted on firms from two divisions of the Frankfurt Stock Market. The section on the Main Market analyses the GAAP choice of 295 firms between internationally recognized accounting standards (IRAS, which includes International Accounting Standards (IAS or IFRS) and U.S. GAAP) and German GAAP (GGAAP). The analysis of 244 Neuer Markt firms reviews the choice between IAS and U.S. GAAP, as such firms must choose one of the two internationally recognised approaches. Statistical analysis was undertaken at three different levels: univariable, bivariable and multivariable analysis. However, conclusions are based on the results of the multivariable analysis, namely multivariable logistic regression models. Results show that the choice of IRAS by Main Market companies is statistically positively associated with their size, being in a quality segment, having a Big-5 auditor and having foreign managers, but is statistically negatively associated with managers` holding equity. In the Neuer Markt, on the other hand, the choice of U.S. GAAP rather than IAS is statistically positively associated with having a subsidiary in the USA, having a Big-5 auditor, and the presence of U.S. investors, but is significantly negatively associated with leverage and profitability. Furthermore, the choice of U.S. GAAP in the Neuer Markt is also a function of being in specific industry sectors. The choice of U.S. GAAP in the Main Market, on the other hand, is significantly positively associated with having a U.S. listing and marginally positively associated with free float.

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Glossary and Abbreviations

AG	Aktiengesellschaft (Stock Corporations)
APB	Accounting Principles Board (Predecessor to FASB)
BFH	Bundesfinanzhof (the Federal Fiscal Court, Germany)
Big-5	KPMG, PricewaterhouseCoopers, Ernst & Young, Deloitte & Touche and Arthur Andersen (During the sample period 2001)
CFO	Chief Financial Officer
DAX	Deutscher Aktien Index (German stock index)
DRSC	Deutsches Rechnungslegungs Standards Committee (German Accounting Standards Committee)
DSR	Deutscher Standardisierungsrat (German Accounting Standards)
DVFA	Deutschen Vereinigung für Finanzanalyse und Anlageberatung e.V (German Federation for Financial Analysis and Investment Advice)
EC	European Commission
EEC	European Economic Community
EU	European Union
FASB	Financial Accounting Standards Board (United States)
FREP	Financial Reporting Enforcement Panel (Germany)
FWB	Frankfurter Wertpapierborse (Frankfurt Stock Exchange)
GASB	German Accounting Standards Board (is a part of GASC)
GASC	German Accounting Standards Committee
GDP	Gross Domestic Product
GGAAP	German Generally Accepted Accounting Principles
GmbH	Gesellschaft mit beschränkter Haftung (limited liability corporation)
GoB	Grundsätze ordnungsäßiger Buchführung (Principles of proper bookkeeping, Germany)
HGB	Handelsgesetzbuch (German Commercial Code)
IAS	International Accounting Standards
IASB	International Accounting Standards Board
IASC	International Accounting Standard Committee

IdW	Institut der Wirtschaftsprüfer in Deutschland e.V (Institute of Auditors)
IFRS	International Financial Reporting Standards
IOSCO	International Organisation of Securities Commissions
IRAS	Internationally Recognised Accounting Standards
KapAEG	Kapitalaufnahmeerleichterungsgesetz (Capital Raising Facilitation Act of 1998)
KG	Kommanditgesellschaft (limited partnership)
KGaA	Kommanditgesellschaft auf Aktien (limited partnership with shares)
LSE	London Stock Exchange
NBFI	Non-Bank Financial Intermediaries
NYSE	New York Stock Exchange
OTC	Over the Counter
ROA	Return on Sales
SEC	Securities and Exchange Commission (United States)
SFAS	Statement of Financial Accounting Standards
SMAX	Small Cap Exchange
TFV	True and Fair View
US GGAAP	United States Generally Accepted Accounting Principles

1 Chapter 1: Introduction and purpose of the study

1.1 Introduction

Over the last few decades, there has been significant growth in the movement of capital across international borders. There has been an increasing need for companies to raise capital abroad, and for investors to invest their money in companies abroad. Financial information produced in different countries lacks international comparability because of the impact of political, legal, cultural, and business environment on reporting frameworks in these countries (Tarca 2004). Given the many advantages comparability can offer for international investing, there has been growing attention to the harmonisation of accounting practices of firms across the different stock markets. The International Accounting Standards Committee (IASC, IASB now) is known as one of the international organizations which has played a vital role in accounting harmonisation. This role started in the year 1973 with the establishment of this organisation. IAS (currently IFRS) are widely seen as common accounting language or an international accounting language. Another internationally widely recognised set of accounting standards is U.S. Generally Accepted Accounting Principles (US GAAP), which is associated with stringent practices and increased disclosure (see Chapter 4). Yet, one should note that US GAAP does not solely consist of accounting standards. In fact it is a vast corpus, which includes FASB statements and interpretations, APB Opinions and AICPA Accounting Research Bulletins, Rules and interpretative releases of the SEC (Gordon, Roberts and Weetman, 1998).

The history of German firms using internationally recognised accounting practices goes back to the early nineties, when some German firms started to use IAS and US GAAP for their group accounts, either in a supplementary form or as reconciliation. However, since 1998 an amendment to the Commercial Code (§ 292a HGB), has allowed companies listed on the German Stock Market to adopt internationally recognised accounting standards (specifically IAS and US GAAP) for the preparation of their consolidated accounts. These developments coincide with German companies starting to look to raise capital abroad to a much larger extent. This is thought to be a result of the reunification of West and East Germany in 1990, which made such heavy demands on state borrowing, that companies were forced to

look abroad to raise capital (Leuz and Wüstemann, 2004, p.455). In addition the privatisation of state owned business also gave an impetus, as the German capital markets were deemed too small to absorb major share issues such as arose on the privatisation of Deutsche Telekom (November 1996 [1]). The Capital Raising Facilitation Act of 1998 (KapAEG[2]) was presented as a concession for companies needing to raise capital abroad. As explained by Leuz and Wüstemann (ibid), this regulation was a reflection of demands for reliable public information required to attract foreign capital. Ordelheide and KPMG (2001, p.1360) describe this reform as a response to the internationalization of financial reporting. In general terms, one can say that both IAS and US GAAP are offered as more sophisticated accounting approaches which can be substitutes for local GAAP in Germany.

By the end of 2001, nearly 28 % of German companies listed on the Frankfurt Exchange (other than the Neuer Markt) complied with either IAS or US GAAP. Furthermore, the Neuer Markt, which was launched in 1997 as a junior stock market for smaller firms, required its companies to prepare their financial statements in accordance with either IAS or US GAAP. By the end of 2001, companies in this market were nearly equally split between IAS and US GAAP.

Following this, in May 2002, the Council of the European Union issued a regulation on the application of IAS requiring listed companies, including those in the financial sector, to prepare their consolidated accounts in accordance with IAS from 2005 onwards. However, this application is deferred for those companies that were using US GAAP at time of this regulation until 2007 (European Parliament, 2004).

The free choice of a particular set of accounting standards raises the interesting question of what factors explain this choice. If one set of accounting standards is superior to the other standards, why do not all German firms comply with this set? The current research attempts to explain why German listed companies decide on using a specific GAAP – US GAAP, IAS or German GAAP

1.2 Reasons for choosing Germany

German companies and their accounting practices gain their importance from the fact that Germany is the third largest economy in the world and consequently is of

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[1] Date of IPO (Flippo, 2003)

[2] KapAEG stands for Kapitalaufnahmeerleichterungsgesetz. It is also translated as Law for simplification of raising capital (Roberts, Weetman and Gordon, 2002, p. 293)

considerable interest (Elston and Goldberg, 2003). Furthermore, as an important leading member state in the EU. it has been the focus of several studies on international accounting harmonisation. Therefore, although this study belongs to a different type of literature, it complements the knowledge provided by studies of harmonisation.

The German model of accounting is very different from the Anglo-Saxon model. which is reflected in IAS and US GAAP. Therefore, a voluntary switch from this model to the Anglo-Saxon one should be an interesting event and one worth examining. German companies are familiar with earnings management (Ball 2004) and by following IAS and US GAAP, they might be sacrificing the chance to manage earnings (Weißenberger, Stahl and Vorstius, 2004). This research answers the question of which specific factors influence this decision.

1.3 Extant literature

Literature on the choice of accounting standards is still limited. The first direct study on the choice of a particular set of accounting standards is that by Dumontier and Raffournier (1998)[3]. The authors investigate voluntary compliance with IAS by Swiss companies. Their study examines the relationship between specific-firm characteristics and the choice of IAS. El-Gazzar and Jacob (1999) do similar work on an international sample of multinational firms, but with only a very few hypotheses. Ashbaugh (2001), on the other hand, explains voluntary compliance with IAS using an international sample at different levels of use (supplementary use and total adoption). Furthermore, it is the first study to investigate the factors associated with the choice between IAS and US GAAP, although only a limited number of factors were studied.

Leuz (2003), on the other hand, studies information asymmetry across IAS and US GAAP in the Neuer Markt. He tests whether ask-bid spreads and share turnover (as proxies for information asymmetry) of Neuer Markt companies using IAS and US GAAP differ significantly across the two groups of firms. Additionally he explores the choice between the two GAAPs and the link with a few firm characteristics. Tarca (2004) does similar work to Ashbaugh (ibid), but through testing a wider range of variables. All the studies above rely on information provided by companies'

[3] This is according to the authors' acknowledgement.

annual reports and financial databases. A very recent work by Weißenberger. Stahl and Vorstius (2004)[4], however, studies the switch from German accounting rules to IFRS or US GAAP using a different type of data. They survey companies on their objectives in choosing either IFRS or US GAAP. They also survey them on whether or not they have satisfied their objectives.

It should be mentioned here that the work in this research is not only based on the literature viewed above. A substantial part of the hypotheses tested in this work are developed from another branch of the literature. This is the disclosure literature which is much larger than the literature on the choice of GAAP. The point in using literature on this different topic is the assumption that German companies adopting IRAS are voluntarily committing themselves to higher levels of disclosure and more stringent practices than those implemented by G GAAP. Therefore, the factors that are suggested by researchers as explaining voluntary disclosure may also explain the voluntary adoption of a relatively rigorous set of accounting standards such as IAS or US GAAP. The same idea is also applied to explain the adoption of US GAAP rather than IAS, where US GAAP is assumed to be more stringent and requiring more disclosure. A discussion of the logic of this assumption is presented in Chapter-5.

1.4 Differences between the current study and previous work

Although two of the studies above are mainly conducted on German data[5], the present research investigates the topic from a different perspective. Whereas Leuz (2003) focuses only on the Neuer Markt, this study includes both the Neuer Markt and the Main Market. Furthermore, Leuz mainly concentrates on the subject of differences in information asymmetry between IAS and US GAAP. Therefore, his work on the choice between IAS and USGAAP is not the main focus of the study. and in turn, he ignores different important features such as internationality and any U.S element[6] in these companies. Weißenberger et al (ibid), on the other hand, consider these factors, but in a survey based study. This is different from the present study which is based on an annually published database of German listed companies

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[4] Published at the final stages of finishing the present research

[5] Tarca (ibid) also included Germany but only as a subsample. Others, such as El-Gazzar and Jacob (ibid) and Ashbaugh (ibid) included German firms within international sample containing companies from different countries (see Chapter 5.

[6] It is intended to be any factors related with U.S., such as having direct investments in the U.S.

which draws on annual reports and stock market data (*Hoppenstedt*). Furthermore, although their sample included all the companies in the Neuer Markt, it included only the *DAX100* companies from the Main Market and excluded a substantial part of this market which includes *SMAX* and other unclassified companies. The present research, conversely, includes all the non-financial Main Market companies. One fundamental difference between their study and the current work is that their work attempts to establish a direct relationship between the companies' choice of GAAP and the motives that led to this choice, whereas the present work attempts to establish the relationship between the choice of GAAP and different firm characteristics. Finally, the two pieces of work have been carried out over nearly the same period; nevertheless Weißenberger et al's work happened to be published first[7].

Whatever the methodological differences between the current research and previous research, this study covers a wider range of variables and provides the chance for an interesting comparison of the analysis of two different choices: between German GAAP (GGAAP hereafter) and internationally recognised accounting standards (IRAS hereafter) and between IAS and USGAAP in the Neuer Markt and amongst Main Market companies using IRAS.

Moreover, the hypotheses tested in this empirical work are developed within a thorough review of two main streams of accounting literature: disclosure literature and accounting choices literature. The comprehensive discussions provided to develop each hypothesis gather numerous arguments borrowed from both streams of literature to form together a substantial body of theory.

1.5 Research questions:

This research attempts to answer four main questions:

- Is the tendency of German companies listed in the Main Market to comply with IRAS associated with firm-specific characteristics, namely: size, being in quality segments, ownership structure, leverage, listing status, internationality of business, internationality of investors, auditor and industry sector?

[7] September 2004, in which this work was at the final stages.

- Is the tendency of German companies listed in the Main Market (and using IRAS) or the Neuer Markt to comply with US GAAP rather than IAS associated with firm-specific characteristics, namely size, ownership structure, leverage, listing status, having business interests in the U.S., having U.S. investors, listing in the U.S., auditor and industry sector?
- Are the factors associated with the choice between GGAAP and IRAS different from those associated with the choice between IAS and US GAAP?
- Are the factors associated with the choice between IAS and US GAAP in the Main Market different from those associated with choice between IAS and US GAAP in the Neuer Markt?

A group of null hypotheses are stated to answer each question. For each firm-specific characteristic, at least one or more null hypotheses are tested. To test the influence of ownership structure, for example, three null hypotheses are suggested for testing, although only two are empirically tested.

1.6 Scope of the study

This study is concerned with non-financial German companies listed on the Frankfurt Stock Exchange, which is the main German exchange for equity shares. However, this market will not be examined as one unit. Two main divisions of this market are the Main Market and the Neuer Markt, which have significant differences from each other. The financial year ending in 2001 is chosen as a sample year. This year is the most suitable choice for this work for two reasons. One is that the annual reports for this year were the latest available reports at the time this work started (further details are discussed in Chapter 6). The second reason is that two years had passed after the amendment of the Commercial Law, which would allow enough time for companies willing to switch to IRAS to do so.

1.7 Organisation of the study

An overview of the remaining 8 chapters is provided below:

1.7.1 Chapter 2: German Stock Market

In order to provide essential background for the following chapters, this chapter aims to provide basic background material on the German Stock Market, to which the

sample firms belong. Furthermore, it provides a simple overview of the German financial system in which the Stock Market is just one element. Detailed discussion is provided on important developments in this market. Special attention in this chapter is given to the Frankfurt Stock Exchange including the Neuer Markt, which used to be a significant part of the Frankfurt Exchange.

In fact, information in this chapter is a key to understanding many of the arguments used in developing research hypotheses in Chapter 5.

1.7.2 Chapter 3: German Accounting

This Chapter is structured so as to study the environment of German accounting from five different angles. The importance of this chapter is evident in the need to know about the accounting rules which are still the main choice in the German market.

First, it provides an overview on the position of Germany in the classification of international accounting models. Second, it uses an approach suggested by Nobes (2000) to look at the environment of German accounting by identifying direct influences. Third, it provides an explanation of the different sources of German accounting regulation. Fourth, it discusses the key features of German accounting in accordance with Gray's model (1988). Finally, it gives a brief overview of the German auditing market. Given the purpose of this chapter, it is intended to be predominantly descriptive rather than analytical.

1.7.3 Chapter 4: an Analytical Overview on the use of GGAAP, IAS and USGAAP

The purpose of this chapter is to provide an explanation of the relationship between GGAAP, IAS (IFRS) and US GAAP. It is structured into six main sections: First, it describes the general attitude of German interested parties towards IAS (IFRS) and US GAAP prior to incorporating them into German Law. Second, the case of Daimler Benz is used to illustrate different important points. Third is a discussion about income smoothing. Fourth, the main differences between the three models of accounting (or maybe two[8]) are explored. Fifth follows a discussion of the value

[8] If we considered that IAS and US GAAP belong to one model (Anglo-Saxon)

relevance of GGAAP compared with IAS and US GAAP. The final section is a brief overview of the prospective use of IAS in EU member states.

1.7.4 Chapter 5: Literature Review and Hypotheses Development

The aim of this chapter is twofold: first is to provide a review of the literature which focuses on the main topic of this research. The second is to develop through this review a set of hypotheses that will be tested in this research. These aims are achieved by supporting each hypothesis with arguments that are borrowed from two main streams of literature: literature on the choice of accounting standards and literature on voluntary disclosure. Ten hypotheses are developed to explain the choice between GGAAP and USGAAP. Furthermore, eleven hypotheses are developed to explain the choice between IAS and USGAAP.

1.7.5 Chapter 6: Research Design

This chapter is intended to give a detailed view of several methodological issues related to the analysis of this research. This will include an introduction to the data resource used, the study sample, the process of data collection, and an introduction to the different statistical methods used. This chapter provides an essential introduction for the following two chapters, 7 and 8.

1.7.6 Chapter 7: Analysis on the choice between IRAS and GGAAP

This chapter contains two main parts: statistical analysis on the choice of GGAAP or IRAS and a discussion on the different results. The statistical analysis takes three different lines: univariable, bivariable and multivariable analysis. The first type provides a summary of some important descriptive statistics of all the variables tested. Furthermore, the t-test and its non-parametric equivalent, Mann-Whitney, are included under univariable analysis. Bivariable analysis includes chi-square tests and the use of crosstabulation. Finally, the multivariable analysis covers the construction of a multivariable model, which tests the different hypotheses in a multivariable setting.

It should also be mentioned that ANOVA and its non-parametric equivalent Kruskal-Wallis are used to analyse the choice between GGAAP, IAS or USGAAP (as three groups).

The second main part of this chapter is devoted to a discussion of the different results.

1.7.7 Chapter 8: Analysis on the Choice between IAS and USGAAP

The choice between IAS and USGAAP takes place both in the Main Market and the Neuer Markt, but in different contexts as explained above. Hence, Chapter 8 presents the results of the analysis of the two markets. The design of this chapter is very similar to that in Chapter 7, although this chapter does not include the use of ANOVA and Kruskal-Wallis (which are designed for the analysis of three groups). Furthermore, the presentation of the different results is followed by a section which provides a detailed discussion of the different results and compares them with those of Chapter 7.

1.7.8 Chapter 9: Summary, Conclusions and Suggestions for Further research

This Chapter is designed to present a summary of the whole study and to provide the main conclusions. It also ends with brief suggestions for further research in related areas.

2 Chapter 2: German Financial system and German Stock Market

2.1 Introduction:

In order to provide essential background for the following chapters, this chapter aims to provide basic background material on the German Stock Market, to which the sample firms belong. However, it is necessary to provide a simple overview of the German financial system in which the Stock Market is just one element. Schmidt and Tyrell (2004) evaluate the German financial system across four headings: banks, non-bank financial intermediaries, financial markets and the regulatory environment in which these institutions work. This structure is used as an approach to describe the German financial system, but, non-bank financial intermediaries and the regulatory framework will be dealt with very briefly[9].

2.2 Banks:

The German banking system can be characterized as "a universal banking system" as it is dominated by universal banks (Hackethal 2004, p. 72). In such a system banks are engaged in all types of financial business. This important role of universal banks in Germany dates back to the nineteenth century. German universal banks can be divided into three groups: commercial banks, savings banks and cooperative banks[10].

Schmidt and Tyrell (2004, p31) state: "In terms of the numbers of banks and banking offices, German was and still is, one of the most heavily 'banked' economies in the world". Furthermore, they report that the ratio of banking assets to GDP is relatively high compared to other industrialized countries.

Elsas and Krahnen (2004, p. 227) summarize the 'close ties' between universal banks and German firms in terms of four ways in which banks can influence management decisions of firms: "debt provision, direct equity stakes, proxy voting rights and supervisory board representation"[11]. Furthermore the so-called *Hausbank* is a prime example of the aforementioned 'close ties'.

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[9] Banks are given more attention because of their significance importance in the German firms as one could see below.

[10] In terms of business volume, the market shares of these banks are (35 %, 40 % and 10 % respectively); whereas specialised banks comprise the remainder (15 %) (Deutsche Bundesbank, 2003).

[11] Yet, one should know, that the importance of debt provision is greater in the case of non-listed firms, for which debt is the only external finance resource.

The *Hausbank* is based on the principle of a long-term stable relationship between German banks and firms. as opposed to the principle of deal-based banking in the UK and US (Schneider-Lenné, 1994). According to Elsas and Krahnen (ibid. p.211). a German bank can be described as a *Hausbank*; if it "(i) has a high share in debt financing, (ii) a high share in payment transactions, (iii), (iv) has a high share in the long-term or short-term financing, (v), (vi), (vii) undertakes special, exclusive, or intense business with the firm, (viii) the period of the bank-borrower relationship is long, or (ix) has influence on the firm's management".

Overall, despite the recent developments in the German financial and economic system, it is not very clear whether this system should be classified as a bank-based system or a market-based system. Schneider-Lenné (ibid, p.287) emphasises that although the relationship between German banks and firms is more than being a borrower-lender relationship, observers outside Germany tend to "grossly overestimate" the influence banks have on the German economy. However, conclusion on the classification of the German financial system may be found in a report by Deutsche Bundesbank (2003, p.4) stating that: "the German financial system can be considered a "hybrid" system lying somewhere between a purely bank-based and a purely market-based system".

2.3 Non-bank financial intermediaries (NBFIs):

There are two main groups of non-bank financial intermediaries in Germany: insurance companies and investment funds. In terms of gross direct premiums written in 2003, the German insurance industry is the fourth largest insurance market in the world after the US, Japan and the UK (Insurance Information Institute, 2004). The investments of insurance funds are mainly in loans and bonds. Furthermore, they indicate that insurance funds invest in domestic equities with virtually nothing invested in foreign equities (Schmidt and Tyrell, ibid)[12].

The second main group of NBFIs is the Investment Funds. It is necessary to distinguish between the investment companies, and the funds themselves. The major shareholders of the investment companies are mainly banks[13] (it can be a single bank or a banking group). These banks usually work as 'marketing channels' for shares in

[12] Although their study is published in 2004, the statistics used in this part were from the year 1999.
[13] Insurance companies are another type of possible shareholders (Maurer 2004)

the funds administered by their investment funds. As in the insurance sector. the majority of these funds are invested in loans and government bonds (ibid).

In terms of both assets under management and market share by 2000. the German mutual funds industry was the fifth largest behind the US. Japan. France and Italy. Still the German investment industry accounts for a low percentage (9 %)[14] of GDP (ibid).

2.4 Regulatory environment:

Schmidt and Tyrell (ibid, p. 39) provide a brief overview of German financial regulation and supervision, which distinguishes three fields: banking. capital markets and insurance. In short, although banking regulations are well developed, "the insurance industry was much more heavily regulated". On the other hand. until the mid 1990s, the stock market was "rather neglected". However, as explained below. the reforms of 1998 and 2002 indicate an increasing orientation towards the German Stock Market. Furthermore, in 2002 the Federal Financial Supervisory Authority was established as an integrated financial services supervisor. which integrated supervisory offices for banking, insurance and securities trading (Fischer and Pfeil, 2004).

Accounting regulations which may be considered as a part of the regulatory environment of the financial system are dealt with in Chapter 3.

2.5 Financial Markets:

German financial markets include the primary markets and the secondary markets for securities and financial instruments, and also the money markets. The remainder of this section is devoted to a detailed explanation of the German Stock Market, as it is closely related to the subject of this research.

2.5.1 German Stock Market:

The German Stock Exchange is known to be both vertically and horizontally segmented (Hunger 2003). In the horizontal dimension it comprises eight regional

[14] Although the references used are up to date. statistics available through them are not the latest.

stock exchanges (merged in six groups currently[15]): Berlin, Bremen, Düsseldorf, Frankfurt, Hamburg, Hanover, Munich and Stuttgart. The vertical dimension, on the other hand, consists of the three statutory segments described below. All the German stock markets have been unified by the Stock Exchange Act ('Börsengesetz') of 1896, which has been revised several times (Deutsche Börse AG, 2003a). Although Germany in terms of GDP has the third strongest economy in the world after the USA and Japan (Economist.com, 2004), the German stock market is not as strong and is relatively small. Furthermore, the German stock market is occasionally characterised as an "emerging market" (Rosen, 1999). Theissen (2004) investigates whether Germany's "organized capital markets are, in some sense, under-developed" (Theissen, 2004, p.139). He based this hypothesis on the fact that the German financial system is typically "a bank-dominated system". The following provides some important statistics which may highlight the position and importance of the German Stock Market in international terms. Moreover, it discusses some of the facts about German equity culture.

2.5.1.1 Number of listed companies:

As can be seen from Table 2.2, in terms of the number of listed shares, Frankfurt[16] (FWB)[17] was the eleventh stock market in the world. However, in terms of foreign companies, it was the fourth one after NASDAQ, NYSE and LSE.

Table 2.1: Numbers of Companies Listed on International Stock Markets

Stock Market	Domestic	Foreign	Total
NASDAQ	3618	445	4063
Canadian. V.E	2688	0	2688
NYSE	1939	461	2400
London	1923	409	2332
Tokyo	2103	38	2141
Madrid	1458	22	1480
Australian	1334	76	1410
Osaka	1335	0	1335
Toronto	1261	38	1299
Euronext[18]	1132	NA	1132
Deutsche Börse	748	235	983

Source: World Federation of Exchanges (WFE) (2001)[19]

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[15] In 2003, Berlin and Bremen merged together to form one Exchange; whereas Hannover and Hamburg were merged in one group operated by Börsen AG (but still regional for small and medium cap firms)

[16] This includes the Official Market, Regulated Market and the Neuer Markt

[17] This abbreviation stands for "Frankfurter Wertpapierborse" (Deutsche Börse AG).

[18] This exchange covers four markets Amsterdam, Brussels, Lisbon and Paris

[19] www.fibv.com

The number of listed German companies has fluctuated during the twentieth century as a result of political, economic and legal changes. In Germany, there are about 3 million businesses of which 600,000 are organised as corporations and some 6500 in the legal form of "Aktiengesellschaft" (Stock Corporation). Of these 6500 stock corporations, approximately, 750 are listed on the stock exchange (German Business Trends, July 2001). These numbers cast light on the great potential for growth in the German stock market. One important thing is that the number of foreign equities traded on the unofficial regulated market (Freiverkehr) in the German exchanges other than FWB is very large. For example, on the Berlin Stock Exchange, it is possible to trade all NASDAQ shares. Furthermore, the number of foreign equities traded on the Freiverkehr market of Berlin in 2001 totalled 9373 (9421 in 2000) from 60 countries (Berliner Wertpapier Börse, 2001).

2.5.1.2 Market Capitalisation

According to statistics provided by the World Federation of Stock Exchanges for the year 2001 which are shown in Table 2.3, Deutsche Börse was the 6th stock market in terms of market capitalisation of listed domestic companies.

Table 2.2: The World's Largest Stock Markets

Market (2001)	Capitalisation (US$)
NYSE	11,026,586.5
NASDAQ	2,739,674.7
Tokyo	2,264,527.9
London	2,164,716.2
Euronext	1,843,528.6
Deutsche Börse	1,071,748.7
Toronto	611,492.8
Italy	527,467.3
Swiss Exchange	527,374.6
Hong Kong	506,072.9

Source: WFE (2004)

2.5.1.3 Market Capitalisation and Gross Domestic Product (GDP):

The ratio of market capitalization to GDP can be an important economic indicator. Table 2.4 shows this ratio across the strongest economies in the world.

Table 2.3: Market Capitalization to GDP% in larger industrial countries

	1990	**1995**	**2001**
UK	88.2	121.6	152.0
US	48.7	95.2	136.3
€ countries[20]	27.4	28.8	70.7
Germany	25.0	23.9	58.1
Japan	98.6	71.4	55.4

Source: Theissen (2004)[21]

It can be seen from Table 2.4 that the capitalisation of the German Stock Market as a percentage of German GDP is small compared with the UK, US and the average of the Euro countries but still higher than that in Japan. The statistics above may not be very meaningful without considering the absolute numbers. It is known, for example, that the US stock market is the largest in the world by market capitalisation (see Table 2.3); nevertheless the US ratio comes third after the UK (and France[22]). This can be explained by the fact that GDP is exceptionally large in the case of USA. However, the US ratio is still much higher than the ratio in Japan and Germany, which are the second and third strongest economies in the world respectively and that is what might show the small relative size of the stock markets of these countries compared with the US. On the other hand, the UK was first because it has lower GDP, whereas it has the third largest stock market. From the numbers shown above, it is clear that German Stock Market has less economic importance than its counterparts in the UK and US. Using older data, a similar conclusion to this was made by Schneider-Lenné (ibid).

2.5.1.4 Dramatic Changes during the decade (1991-2000)[23]

The German Stock Market witnessed significant changes during the decade (1991-2000). These changes were in part reflected in market capitalization and the average number of Initial Public Offers (IPOs). The average between 1949 and 1982 was 3.3, whereas this average increased to reach an annual average of 19.5 between 1984 and 1996 (Franzke, Grobs and Laux, 2004). As can be seen in Table 2.5 and Figure 2.1 below, there was dramatic increase in the number of IPOs in the last three years of the decade. This dramatic increase can be explained by the introduction of the Neuer

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[20] The average for the Euro countries
[21] The original reference for this is DAI Factbook (2002)
[22] According to statistics taken from WFE, this percentage for France is 111 % for 2000 (144 % for 2001 as calculated by the researcher based on figures taken from www.finanzplatz.de
[23] Source: www.finanzplatz.de

Markt in 1997 (ibid). Furthermore, this dramatic increase in IPOs was combined with an increase in market capitalization. Conversely, in the year 2000, the substantial increase of 152 new companies combined with a decrease in market capitalization. It can be seen from Table 2.5, that the market capitalization decreased in the years 2000, 2001, 2002 (4 %, 12 % and 46 % respectively) in spite of the increase in the number of listed companies. This was simply due to the general fall in stock prices.

Table 2.4: Market Capitalization and IPOs in German Stock Market

Year	Market cap € Mio	% change	IPOs	% change
1991	304,973	-	19	19
1992	287,292	-6	9	9
1993	409,084	42	11	11
1994	395,679	-3	15	15
1995	422,523	7	20	20
1996	528,713	25	14	14
1997	758,681	43	36	36
1998	931,629	23	79	79
1999	1,428,873	53	175	175
2000	1,371,271	-4	142	142
2001	1,203,681	-12	26	26
2002	647,492	-46	7	7

Source: based on information taken from WFE and Franzke et al (2004)

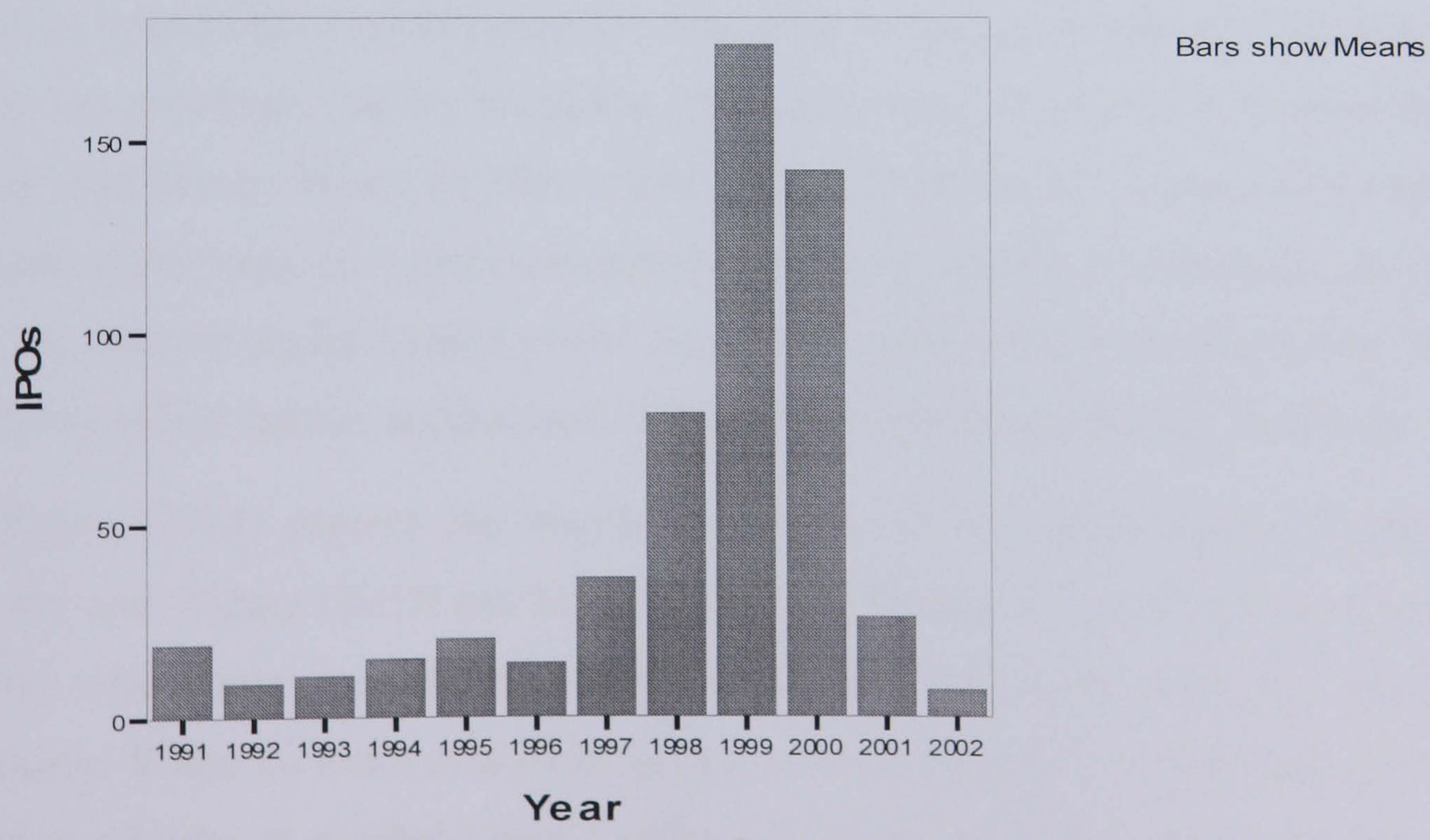

Figure 2.1: Initial Public Offers (IPOs) 1991-2002

2.5.1.5 Equity Culture in Germany:

One of factors which might affect the growth of the stock market may be the lack of an equity culture within German society (Rosen, ibid). One argument is that German firms are commonly said to be more highly-geared than firms in the UK and US. Consequently, this has had a negative impact on the growth of the German Stock Market (Murray, 2001). However, this argument may not be entirely true. Edwards and Fischer (1994), for example, criticise the fact that international comparisons always show that equity debt ratio in Germany is higher than that in the UK. They indicate that accounting rules may be behind these differences. They also report that some researchers such as Perlitz et al (1985) proved that after adjusting for accounting differences, there are no substantial differences in the debt-equity ratios of German and British enterprises.

Furthermore, Rajan and Zingales (1995) who compare the leverage in the G7 to provide surprising results by showing Germany and UK were less levered than other countries[24]. The differences between the two countries did not seem to be significant at all.

Figure 2.2 below shows the percentages of shareholdings in the German equity market. The largest shareholding group is non-financial firms with a percentage of 32.5 %. The percentage held by households, on the other hand, is relatively small (compared with 39.1% in the US). This seems to be consistent with the fact that German households tend to invest in bank deposits and government or bank-issued bonds (as mentioned earlier, Germans, in general, have propensity to acquire bonds rather than shares) Based on these observations, Theissen (ibid) concluded that the German capital market is underdeveloped in terms of volume. Furthermore, he states that the German capital market is also underdeveloped in the legal dimension. But it should be noted that his conclusion is based on a comparison with US standards.

McMillan (2004) reports the results of studies by La Porta, Lopez-de-Silanes, Shleifer and Vishny (2002) and Leahy, Schich, Wehinger, Pelgrin, and Thorgiersson (2001) which rate investor protection in different industrial countries including Germany. While La Porta et al (ibid) give a score of 5 for the UK compared to 1 for Germany; Leahy et al (ibid.) give a score of 0.86 for the UK compared to 0.23 for

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[24] Theissen (2004, p.140) for some reason report the wrong results of this study by saying that Rajan and Zingales found that the book equity to capital is the lowest in Germany.

Germany. It is clear that Germany has been rated significantly lower than the UK. This raises an interesting question about the relationship between the lack of a strong equity culture in Germany and weak investor protection. Is weak investor protection the result of the lack of a strong equity culture, or is it the other way round? According to recent reforms in the German market, one can argue that, at least now, German legislators are trying to improve the legal environment for investors to create a stronger equity culture.

Nowak (2004) presents a chronology of formal legal changes in the German Capital Market. Examples of these changes are: First, Second, Third, Fourth Financial Market Promotion Act (1990, 1994, 1998 and 2002 respectively); changing Rules and Regulations of the German Stock Market (1997); Raising of Equity Relief Act (1998) and Tax Reduction Act (2000). These reforms, in general, have increased the scope of investor protection in the German regulatory environment. Hence, these legal changes are, in fact, milestone events which may lead to the convergence of the German capital market towards the Anglo-American model (a market-based model) (Nowak, ibid; Theissen, ibid). Finally, the latest restructuring of FWB (described in a later section) can be viewed as a positive step taken by Deutsche Börse to sustain Germany's equity culture.

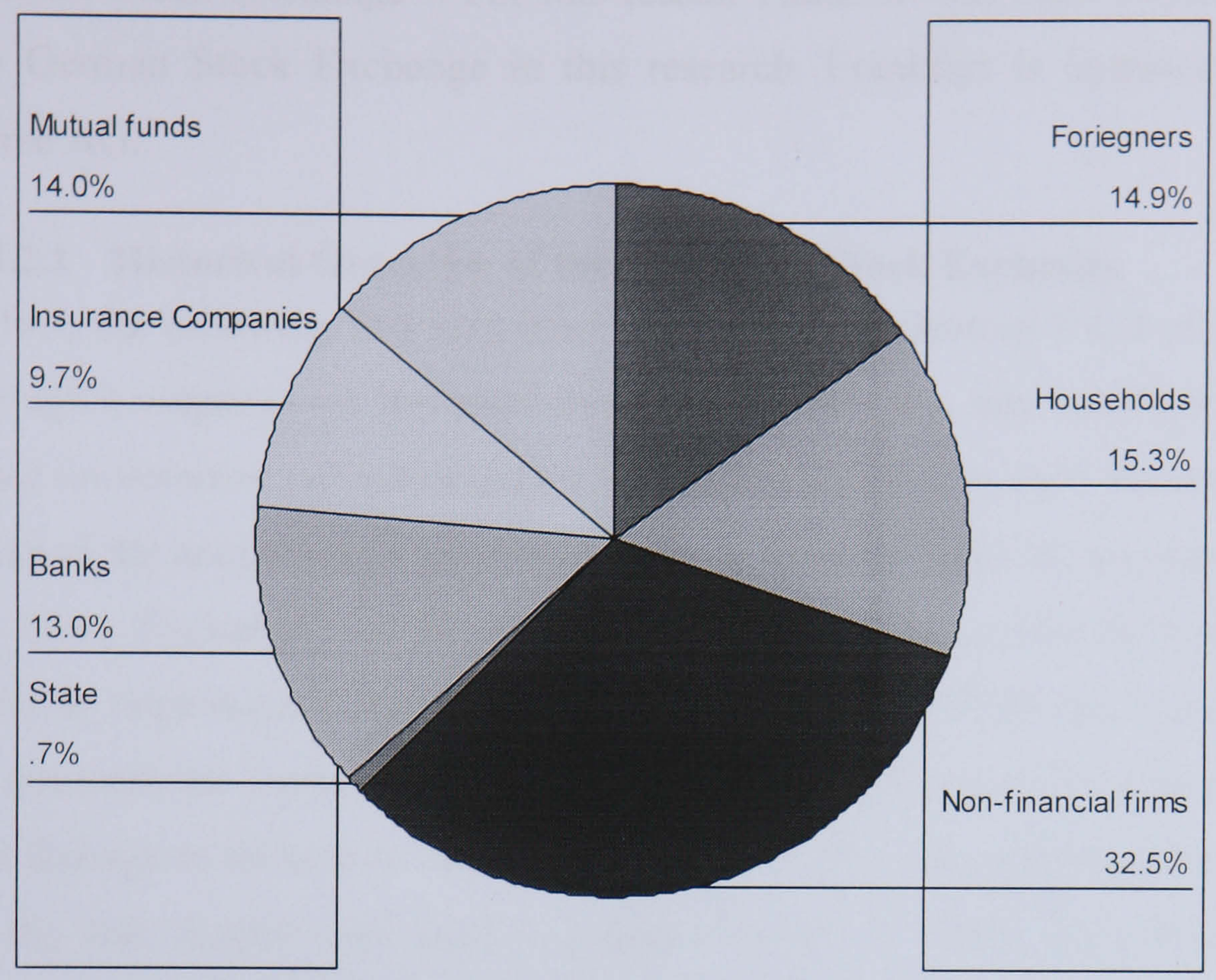

Figure 2.2: Shareholdings in the German Stock Market

Source: Theissen (2004)

2.5.2 Frankfurt Stock Exchange

Frankfurt Stock Exchange (FWB) is the largest of the eight German Exchanges. The vast majority of German equities (approximately 83 %[25]) are listed on FWB. Moreover, in the year 2000, about 87 % of the total German stock exchange turnover from equities was realised in FWB. The role of Frankfurt in international financial services has been examined in different studies, such as a survey carried out by CEER (Centre for European Economic Research) and a survey carried out by Bristol University in 1996 (Bindemann, 1999), Results proved the competitive position of this market among its European rivals, the Paris and London Exchanges, although London is still the leader in many respects. For different international organisations which are concerned with international economic statistics such as the World Bank and the World Federation of Exchanges, Frankfurt has become a synonym for the

[25] This percentage is calculated according to the information in Hoppenstedt. The number of domestic firms which are traded on German Stock exchanges but not on FWB is approximately 150 (78 on the Official and 72 on the Regulated). In general these firms are small and local (operate in the cities where the other exchanges belong).

German Stock Exchange[26]. For this reason Frankfurt has been chosen to represent the German Stock Exchange in this research. Frankfurt is operated by Deutsche Börse AG.

2.5.2.1 Historical Overview of the Frankfurt Stock Exchange

In fact, the following is a very brief overview of the history FWB which developed through a sequence of historical events. Frankfurt as a city has been an important place for commercial transactions since medieval times. In 1605 the name Börse was given to the annual meetings of merchants to regulate financial transactions. In 1896, the Stock Exchange Act was enacted to gather the German Stock Exchanges into a uniform organisation. By the end of World War I, the FWB had lost its position as an international market with the disappearance of all foreign securities from its lists and damage to its historic building. The Nazi regime also hampered the development of the free market and stock exchange trading. In 1956, the trading of foreign securities started again on the FWB (Deutsche Börse, 2003a).

2.5.2.2 Contemporary FWB:

The contemporary FWB can be characterized by several events in the last few decades, which will be discussed below. First central transactions via computer were introduced in Frankfurt in 1969; in 1988 the DAX share index was launched to become one of the world's most important indices; the establishment of Deutsche Börse AG in 1993 to be the operating body of FWB; foundation of the Neuer Markt in 1997; and finally in the same year Xetra, the new electronic trading system, was introduced for German and cross-border securities trading in Frankfurt (explained below).

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[26] This is clear from the fact that data on Frankfurt is used in international databases without considering any of other stock markets

2.5.2.3 Number of firms listed on FWB:

Table 2.6 below shows the numbers of companies listed on FWB for the years 1995 to 2001.

Table 2.5: Numbers of Domestic Listed Companies

Year	Official Trading		Regulated Market		Unofficial Reg. Market		Neuer Market		Total
		%		%		%		%	
1995	297	68.9	77	17.9	57	13.2	0	0	431
1996	303	70.0	73	16.9	57	13.2	0	0	433
1997	305	67.8	75	16.7	57	12.7	13	2.9	450
1998	323	59.8	75	13.9	88	16.3	54	10	540
1999	354	50.4	88	12.5	92	13.1	168	23.9	702
2000	366	40.4	95	10.5	161	17.8	283	31.3	905
2001	359	39.4	118	12.9	163	17.9	272	29.8	912

Source: Hunger (2003)

2.5.2.4 Market segmentation in FWB

FWB is structured according to two types of segmentation: statutory segmentation and quality segmentation.

2.5.2.4.1 Statutory segmentation:

According to this type of segmentation, FWB is divided into three market segments: Official Market (Amtlicher Markt), Regulated Market (Geregelter Markt), and Unofficial Regulated Market (Freiverkehr: over the counter). These segments are defined by the German Stock Exchange Law and Listing Application Regulation. Since this segmentation is defined in German Law, it is applied to all German Exchanges.

Official Market (Amtlicher Markt): Official Market is the segment that posts the highest turnover on the FWB. Furthermore, it is the oldest market segment in the German stock exchanges (Hunger, 2003). Companies on the official list must go through an approval process under public-sector legal provisions with strict admission criteria. Provisions regulating the official listing are supplied by the Stock Exchange Act, the Stock Exchange Listing Directive and the Offering Prospectus Law. The minimum age for companies on the Official Market is three years with regular published financial statements during this period. The minimum expected issuing value is EUR 1.25, while the total par value must be at least EUR 250,000. Furthermore, companies are required to have a minimum free float of 25 %. Stocks

listed on this segment currently[27] are 555 shares including the 30 standard stocks making up the DAX. 4,300 Bonds are listed in this segment (Deutsche Börse AG. 2003b).

Regulated Market (Geregelter Markt): although the legal provisions regulating the admission to this segment are the same as the Official Market, admission criteria are less strict. This segment was founded ninety years later than the Official Market to lower the market-entry-barriers for small companies to facilitate the raising of capital (Hunger 2003). There is no minimum age for the companies listed on this segment, but the minimum capital required is of total par value of EUR 250,000 with a minimum of 10,000 shares. This segment is usually used by medium-sized companies when going public. Some 200 shares and about 1,200 bonds are in this segment (Deutsch Börse AG, 2003b).

Regulated Unofficial Market (Freiverkehr):

This segment is for trading unlisted securities (over the counter, OTC). The OTC market had existed even before the Stock Exchange Act in 1897 (in unregulated form). However, it has been developed into a regular and an "unregular" OTC market (Hunger, 2003). In 1987, as a result of legal reforms, the OTC market took the form of Regulated Unofficial Market and Non-Regulated Unofficial Market. This segment is not an organized market within the meaning of the German Securities Trade Act (§ 2 para. 5WpHG) (Deutsche Börse AG, 2003b). This market is regulated by the private rules of Deutsche Börse AG. As explained later in Chapter 6, this market is not within the scope of this research which is only concerned with listed firms.

2.5.2.4.2 Quality Segments

While the statutory segments described above are defined by law, the quality segmentation in FWB is set up by Deutsche Börse AG under private law and high transparency requirements. One important thing is that the current quality segmentation in FWB is different from that during the sample period. While this section explains the segmentation during the period of the current study (2001), another section below describes the recent developments in the structure of FWB. The FWB was segmented into DAX, MDAX, SMAX and the Neuer Market. The

[27] Jan 2003

criteria which govern the choice of companies for DAX or MDAX are different from the ones for SMAX and the Neuer Market.

DAX: this abbreviation stands for Deutscher Aktienindex (a registered trademark). This segment comprises Germany's top 30 blue chips. The main criteria considered for companies to be included in this segment are[28]: turnover, market capitalisation, quarterly reporting duty, holding analysts' conferences, and block ownership versus free float. However, one should remember that only firms in the Official market are required to have minimum free float; and that DAX is open for companies from both Official and Regulated markets. The composition of this segment is checked annually and adjusted in September. However, all the companies currently in this segment are from the Official List. One should notice that after the reorganisation of Deutsche Börse's segments in 2003, firms cannot be listed on DAX unless they are listed on the Prime Standard.

DAX is the index associated with this segment and is considered to be a major mood barometer for the German economy. Shares related to this index account for 80 percent of FWB's turnover and 70 percent of the whole German stock market. This last piece of information proves the significant role of DAX companies in the German economy.

MDAX: This segment comprised the 70 largest German companies (currently 50)[29] which are not included in the DAX. This segment is described by Deutsche Börse as the springboard for companies to the DAX. Like DAX, this segment has its index which is MDAX containing all 70 companies. The composition of this index is checked semi annually and adjusted in March or September. Listing in this segment is based on the same criteria used in DAX.

Changes in DAX and MDAX are decided by the Executive Board of the Deutsche Börse.

SMAX: Companies in SMAX are not classified according to their turnover or capitalisation as in DAX and MDAX. Companies in SMAX are of small and medium size and they have voluntarily chosen to adhere to strict transparency and liquidity standards. Decision on admission to SMAX is taken by Deutsche Börse.

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[28] Details of this criteria can be found on the Deutsche Börse's website
[29] Recent changes in Market segmentation are discussed below.

while eligibility of companies to be in SMAX is conditional on being listed in Official Market or Regulated Market on FWB, with a minimum free float of at least 20 percent. In addition, it must meet stringent disclosure standards and to organise a yearly informational event for analysts. Companies on SMAX were supposed to comply with either IFRS or US GAAP from 2002 onwards[30] (Deloitte and IAS Plus, 2001). This gives these companies the chance to go above the second-tier stocks in order to attract investors and analysts. The number of firms currently in SMAX is 63[31], whereas at the end of 2001 it was 127. Unlike DAX and MDAX, foreign companies are allowed to inter SMAX. The Index related to this segment was SMAX All Shares which comprises all shares in the SMAX segment. This segment was closed at the end of 2002 within the reorganisation of FWB (see below).

Neuer Markt: This market was launched in March 1997. It is a customised segment for companies in sectors such as telecommunications, media and entertainment, technology, software, internet, IT services, biotechnology, industrial services, medical technology, and financial services.

2.5.3 Overview of the Neuer Markt:

The Neuer Markt is considered as 'a growth market' because it contains young companies which belong to the sectors mentioned above. This market and some other European markets are NASDAQ look-alikes produced for smaller companies. Examples of these markets are the UK AIM and the French Nouveau Marché.

Although the Neuer Markt is separate from the Regulated Unofficial Market, the private law of the Neuer Markt implemented stricter requirements for the admission of securities and ongoing disclosure obligations than those in the official market and the regulated market. Furthermore, these requirements may be in some areas even stricter than those of NASDAQ (Shearman and Sterling 2001; Hunger 2003). For admission to the Neuer Markt, companies are required to have an equity capital of at least € 1.5 Mio (Official market: € 1.25 Mio). The aggregated market price of the issue had to amount to at least € 5 Mio (Official market: € 2.5 Mio). Additional requirements concern the minimum nominal value of the issue (€ 250,000) and the minimum number of shares (100,000). The issuer should have had a track record of,

[30] This of course comes after the sample period.
[31] Jan 2003

at least, three years, and the free-float of the issue had to be at least 25 % of the aggregate nominal volume. After going public, firms were required to publish quarterly reports, financial statements and management reports according to IAS or US-GAAP in both German and English. Furthermore, the issuers were required to hold an analysts' meeting at least once a year (Burghof and Hunger, 2003).

In a few years the Neuer Markt has attracted European shares from all over Europe and has become a strong competitor. "For flying starts the Neuer Markt stands unrivalled" (The Economist 1999). It can be seen from Table 2.7 that the Neuer Markt had the largest share of new issues for the four years, although other markets such as NASDAQ Europe (EASDAQ previously) and Nouveau Marché are pioneers in the growth markets. Figure 2.3, on the other hand, shows how large the proportion of the Neuer Markt in the total market capitalization of the European 'growth market'[32] was, as at July 2001.

Table 2.6: Number of IPOs and Issuing Volume in European Growth Market

Year		IPOs Europe	Neuer Markt	SWX	Nuovo Mercato	NASDAQ Europe	Nouveau Marché	AIM
1996	Number	19	0 %	0 %	0 %	21 %	79 %	0 %
	Volume € Mio	451	0 %	0 %	0 %	50 %	50 %	0 %
1997	Number	45	29 %	0 %	0 %	33 %	38 %	0 %
	Volume € Mio	1411	56 %	0 %	0 %	32 %	12 %	0 %
1998	Number	101	43 %	0 %	0 %	16 %	42 %	0 %
	Volume € Mio	3181	51 %	0 %	0 %	32 %	16 %	0 %
1999	Number	261	51 %	2 %	3 %	6 %	12 %	25 %
	Volume € Mio	9479	70 %	5 %	3 %	12 %	5 %	4 %
2000	Number	436	32 %	3 %	7 %	1 %	12 %	45 %
	Volume € Mio	22067	59 %	5 %	16 %	2 %	7 %	10 %
2001	Number	79	9 %	0 %	6 %	0 %	13 %	72 %
	Volume € Mio	5765	11 %	0 %	2 %	0 %	13 %	74 %

Source: Deutsche Börse AG, Neuer Markt Report (2001)

[32] explained above that it is for young innovative firms

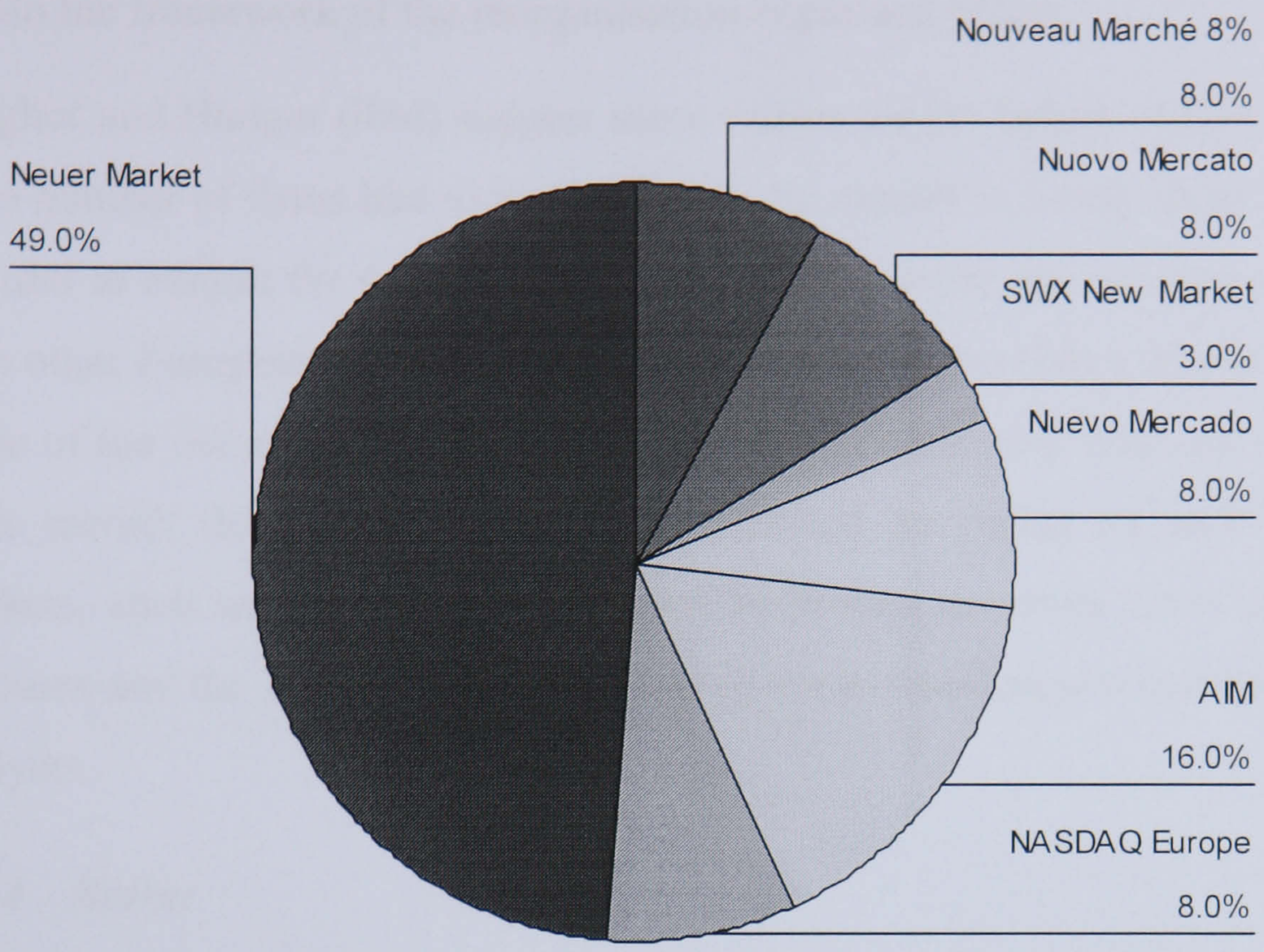

Figure 2.3: Market Capital Distribution in the European Growth Market, as at July 2001

Source: Deutsche Börse AG

Among its European rivals, the Neuer Markt benefited the most from the high-tech bubble in the late nineties. Consequently, it suffered the most from the bursting of this bubble in 2000 (Audley, 2004). Furthermore, in 2001[33], the Neuer Markt continued to lose its dominant position with a series of scandals and legal disputes involving misleading disclosure practices, insider trading and obvious fraud (Nowak 2004). Deutsche Börse AG tried to maintain the continuity of the Neuer Markt by tightening the disclosure rules and implementing contractual penalties. This led to large number of delistings and many companies left this market for less regulated market (ibid). By October 2002, the Neuer Markt's index had lost more than 95 per cent of its value. In contrast to what is quoted from the Economist (US) (1999) above, the following is quoted from the Economist (US) (2002): "Deutsche Börse which runs the Neuer Market, would have shown the door to more such "penny stocks" had it not been stopped in court".

[33] The issues of inadequate reporting were raised earlier than 2001. In 2000 alone, 102 were officially criticized for inadequate quarterly reporting (Nowak 2004).

In June 2003 Deutsche Börse decided to close the Neuer Markt in December 2003 within the framework of the reorganisation explained below.

Burghof and Hunger (ibid) suggest some causes for the failure of this market: first, a large number of firms had to be brought to the market in a very short period of time, in order to exploit the push of the primary market in the late nineties and to compete with other European markets; second, many firms in the Neuer Markt did not satisfy some of the listing requirements such as the minimum free float and the three years track record; third, some other factors affected the Neuer as well as other stock markets, such as, the failure of auditors to protect investors from manipulation in accounts and the irresponsible behaviour of some investment consultants or financial analysts.

2.5.4 Xetra:

A brief overview of Xetra is necessary as it has a significant role in the performance of FWB. Xetra was introduced by Deutsche Börse AG in 1997 as an electronic order system to replace IBIS[34]. However, the implementation of Xetra was made on a "step by step" basis in several releases between 1997 and 1998 (DeMarchi and Foucault, 2000). Shares are traded simultaneously on the floors of the eight exchanges and on the electronic trading system, Xetra; nevertheless there is no price link enforced between Xetra and the floors[35]. Trading on this system is based on a strict price and time priority[36]. This means a better price is the dominant priority. Yet, in the case of price equality, the early price input has the priority (Hau, 2001). While floor trading is organized as an auction system, trading on Xetra is described as "a hybrid of an auction and a market maker system" (Leuz, 2003, p.452). Figure 2.4 below shows Xetra's increasing market share of the German equity trading volume. It can be seen that this proportion reached its highest share of 71.4 % in the year 2003.

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[34] An older electronic system built in 1991 to trade the most liquid stocks.
[35] As a result of this price discrepancies between Xetra and trading floors which can be up to 1 % (DeMarchi and Foucault, 2000)
[36] Price is the first priority in the buy orders. However, with several orders take place with the same price, a secondary priority rule is the time of the order so that orders are executed according to their arrival time (ibid).

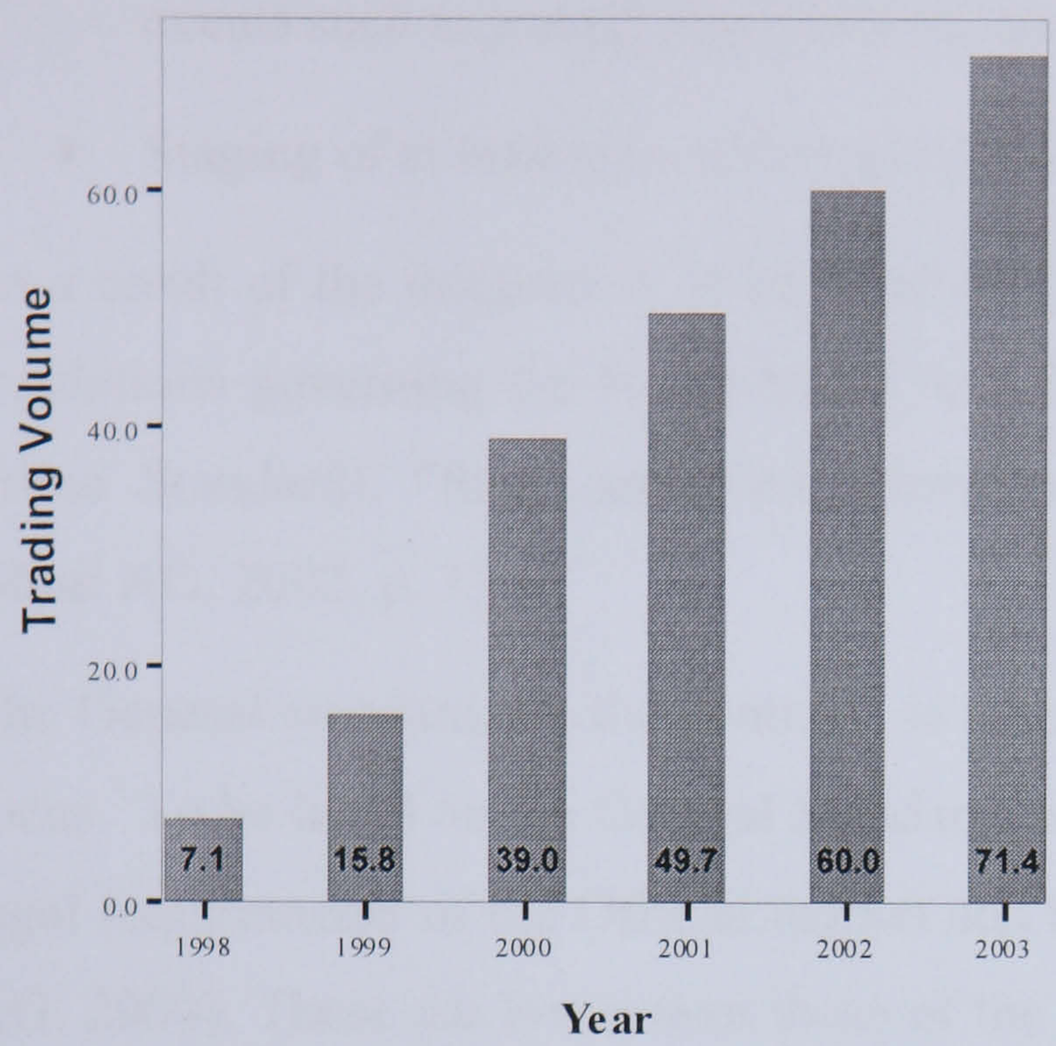

Figure 2.4: Xetra Market Share of Total German Equity Sales (order book volume, in percent %)

Source: Deutsche Börse AG, Annual Report 2003

2.5.5 Reorganization of FWB:

In September 2002, Deutsche Börse AG announced its intention to reshape the trading segments of FWB. Through this announcement the Management Board stated that these changes were a response to the implementation of the Fourth Financial Markets Promotion Act in July 2002.

By the end of March 2003 the restructuring of FWB was imposed. This process entailed dividing the market into two main segments: Prime standard and General standard. The Prime standard is designed to contain companies with international focus and aiming at international visibility. Firms on the Prime standard comprise four different indices: DAX, MDAX, SDAX, and TecDAX. The listing requirements of the Prime Standard include a number of important disclosure obligations:

- Compliance with IFRSs or US GAAP
- Accounts audited in accordance with International Standards of Auditing (ISA).
- Publication of quarterly reports in accordance with IFRS or US GAAP.
- Publication in both German and English

- Issuers should publish a corporate action timetable showing all important events such as annual shareholders' meeting and the meetings of analysts.
- Staging of at least one analyst conference per year[37].

As a result of the integration of all important elements of existing private rules and regulations governing the Neuer Markt and SMAX into a new legislation (into the Prime Standard), "their continued operation will become redundant" (Deutsche Börse AG, 2002, p. 3).

The General standard, on the contrary, is tailored for smaller firms with a domestic focus. To be listed on the General Standard, companies need to satisfy the minimum legal requirements of the Official market and the Regulated market (Deutsche Börse AG, 2004). These are lower than those of the Prime standard and not customized to the needs of international investors (Theissen 2004).

According to the new reforms, the number of MDAX companies has been reduced to 50 companies belonging to the classic sectors[38]. SDAX, on the other hand, contains an additional fifty firms from the "classic" sector. These are the next 50 issues from the Prime Standard ranked below the MDAX[39]. Furthermore, TecDAX index was launched to track the largest and most liquid issues from the different technology sectors ranked below the DAX (Deutsch Börse AG, 2004).

2.6 German Corporate Governance System:

The German corporate governance system has attracted the attention of researchers in the financial field. This can be explained by the fact that this system is different from those of other Western European countries, let alone those of the UK and US (Peck and Ruigrok, 2000). In fact it is a very wide subject because it has different facets and interacts with different elements in the financial system. Therefore, this section will be confined to describing the German model of corporate governance, its key aspects, and its relationship with German accounting.

German corporate governance, in general, is organised by the Stock Corporation Act (Aktiengesetz), the German Co-determination Act (*Mitbestimmungsgesetz*) and the

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[37] In general, changes are in line with best practice of many German companies and also a formal recognition towards a more Anglo-American style.
[38] Called by Theissen "Old economy", this description is to distinguish them from the high tech firms.
[39] However, until March 2003 this index represented the largest 50 companies in SMAX.

German Corporate Governance Code revised in May 2003 (German Corporate Governance Code, 2004).

German firms are governed by a two-tiered board structure, comprising a supervisory board (*Aufsichtsrat*) and a board of management (*Aufstand*). However, only listed firms (AGs) and large GmbHs are required to have supervisory boards (Edwards and Fischer, 1994). This system is different from the UK and US system which has a single tier board (Board of Directors) that comprises two types of directors: executive and non-executive.

The separation of power and responsibility between the three organs is largely defined by law which gives limited power to shareholders' general meetings (Rieckers and Spindler (2004). Schmidt and Tyrell (ibid) report that the Stock Corporation Act gives "little power" to the shareholders' meeting, "moderate power" to the supervisory board and "considerable power" to the executive board. Different rights are granted to the shareholders by the Stock Corporation Act, which can be exercised though the general meeting. Examples of such rights are: the discharge of the executive committee and the supervisory board and the election of the shareholders' representatives to the supervisory board. The management board, on the other hand, is concerned with managing the day-to-day business of the company and representing it to third parties. Furthermore, its members share joint responsibility for all management decisions. The supervisory board supervise the management board and appoints its members and fixes their remuneration. Fundamental matters, such as decisions which may have important impact on the financial position of the firm and (or) its results should be approved by this board. Furthermore, the management board should provide regular reports to the supervisory board (Schmidt, 2004).

Although it is not in the scope of this research to present a full comparison between German corporate governance and Anglo-American model, it may be useful to report a few differences between the two systems. While, the management board in Germany may be an equivalent to the executive directors in the Board of Directors of the UK and US (Franks and Mayer, 2001), it is not right to think that the supervisory board in Germany is similar to the non-executive directors in the Anglo-American model. While non-executive directors "should be free from any business or financial connections with the company apart from their fees and shareholdings" (Watts, 1996,

p. 207). members of the supervisory board have stronger relationships where the workers and banks have significant representation (more below). The supervisory board has a significant role in determining the remuneration of the board of management, whereas in the Anglo-American model the non-executive directors do not determine the remuneration of the executive directors (ibid). One of the peculiarities of the German model is the significant influence of the codetermination concept, which requires the representation of employees on the supervisory board. Employees in the Anglo-American model, conversely, do not have a similar opportunity to have direct influence on their companies' decisions. Although German companies use performance-based compensation payments such as stock-options (Government Commission of the German Corporate Governance Code, 2003), this type of compensation is less important than that in the Anglo-American model, in which it is considered as one of the principal mechanisms for managerial remuneration (Watts, ibid). One simple explanation for this is the fact that the importance of the stock market in Germany is less than that in the UK and US. Finally, a vital corporate control mechanism which can give the Anglo-American model an advantage over the German one is an active market for corporate control. Apart from the Mannesmann-Vodafone takeover in 2000, this market discipline is not common in Germany. Although the market for corporate control provides a way of dealing with underperforming managers, it may have undesirable side-effects. The two tier board tries to keep the disciplinary function in house. However, the adoption of a German Takeover Law in 2002 may be considered as an improvement in towards a shareholder perspective, although it keeps this balanced with the interests of other parties (ibid)

It may be useful to extract some main features of German corporate governance as presented in the following points:

1. An insider controlled and stakeholder oriented system against the market controlled and shareholder oriented corporate governance system of the Anglo-Saxon countries (Franks and Mayer, 1994). In simple words this reflects the importance of different stakeholders for information producers in a company rather than concentration one single party as in the UK and US.

2. Influential groups use their influence through the supervisory board. This is achieved on the basis of detailed information, but "much too detailed to be presented to the general investing public" (Schmidt, ibid, p. 397)

3. The law of codetermination gives the employees rights on the supervisory board through a number of seats, which can be one third or 50 % of all seats in firms with more than 500 or 2000 employees respectively (Elsas and Krahnen, ibid).

4. The majority of votes are delegated to banks through proxy voting rights[40]. Consequently, small shareholders and institutional investors who are not affiliated with banks have a minor role (Hackethal, Schmidt and Tyrell, 2003).

5. Apart from labour representatives, banks and block holders, influential groups in the supervisory board "governing coalition" include former top managers of the respective companies or managers from other large companies (ibid, p. 2).

Becht and Böhmer (2003) report that approximately 82% of officially listed AGs[41] have a large block-holder (controlling more than 25% of the votes), while 65% are majority controlled. They also report that the largest number of voting blocks (greater than 5%) is held by families and individuals. However, they indicate that banks and industrial firms hold substantially larger blocks and account for a larger fraction of total shares held by block-holders. Schmidt and Tyrell (ibid.) explain that these block-holders have the right to veto important decisions at shareholders' meetings. This seems to be very different from the ownership structure in the US and UK, where family ownership is not a common feature and shares tend to be more dispersed. Furthermore, UK/US shares are largely owned by financial institutions which invest on a portfolio basis (Vitols 2003). This difference in the pattern of ownership also has an implication for the long-term relationship between German shareholders and the firm compared with a more short-term perspective in the Anglo-American model. One main reason underlying this difference is the motives shareholders have. Whereas in Germany some industrial and commercial companies tend to buy large block holdings in other companies for industrial and strategic

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[40] Recall that the dominant type of shares in Germany is bearer shares which are deposited in banks.
[41] Listed in the Official Market

reasons. financial institutions in the UK and US are motivated by the need to maximise the return on their portfolios and tend therefore to feel less loyalty and to be much readier to buy and sell.

It should be also mentioned here that this type off relationship between firms and shareholders has implications for accounting practices. Ball (2004, p. 137) argues that relative to the shareholder model, the stakeholder model concentrates on dividing the profits (the pie) rather than maximising them. Therefore, this may lead the managers, representatives of labour and capital "to hide behind poor public disclosure and avoid accountability for bad strategic decisions". Furthermore, as mentioned several times above, the German system is an insider system with a stakeholder orientation. This simply means that stakeholders who are represented in governance are privately informed. In other words, this implies that they have inside access to information. Ball (ibid, p. 117) argues these are characteristics in Code-law systems, which have "a lower standard of financial reporting and disclosure". There is clearly less need for disclosure, whereas a market-based system requires good disclosure to allow investors who are outsiders to make their investment decisions.

Another important link with accounting is the role that corporate governance can play in the enforcement of accounting rules. Leuz and Wüstemann (ibid, p. 467) explain that this role is reflected in three different respects. First, management is responsible for "proper application of accounting standards". Second, the supervisory board is concerned with examining the financial statements after they have been audited. Finally, the reform of 1998 required the supervisory board to be in charge of hiring the external auditor (as it used to be a duty of the management board). This change can be considered as a step of strengthening the role of the supervisory board, which is in turn, may be a sign of a transitional stage of German corporate governance towards a market-based model (see Hackethal et al, ibid; Rieckers and Spindler, ibid). Hackethal et al notice that big German banks such as Deutsche Bank are reducing their traditional corporate governance role because they do not benefit much any more from this role. This change in the role of banks and the increase in the top management compensation are seen by the authors as key elements in the move towards the Anglo-Saxon model.

2.7 Important implications of this chapter for the current research:

Many of the hypotheses discussed in Chapter 5 are to some extent related to agency theory (hypotheses on size, free float and leverage). Issues about ownership structure, corporate governance and the nature of the relationship between German banks and firms are largely linked to this theory, and therefore, important in understanding some of the logic of the arguments presented in Chapter 5. Furthermore, the peculiar characteristics of these issues in Germany might lead one to expect different results from those of previous research that examined similar hypotheses in other countries. Furthermore, the quality segments in FWB are also peculiar to the German Stock Market. Thus, understanding of the nature of these segments is necessary to understand the hypotheses on quality segments postulated in Chapter 5.

3 Chapter 3: Accounting in Germany:

3.1 Introduction:

In order to provide a complete picture, this chapter aims to present the background to German accounting. This Chapter is structured so as to study environment of German accounting from five different angles. First, it provides an overview on the position of Germany in the classifications of international accounting models. Second, it uses an approach suggested by Nobes (2000) to look at the environment of German accounting by identifying a few direct influences. Third, it provides an explanation of the different sources of German accounting regulation. Fourth. it discusses the key features of German accounting in accordance with Gray`s model (1988). Finally, it gives a brief overview of the German auditing market. Furthermore, because of the purpose of this chapter, it is intended to be predominantly descriptive rather than analytical.

3.2 German accounting model in the classification studies:

According to several famous classification studies of international accounting systems, Germany has always had a distinctive accounting model. Table 3.1 shows the position of the German accounting system in the results of some of these different studies compared with those of both the US and UK which represent the Anglo-American model. It can be clearly seen that German accounting system has always been classified differently from those of the UK and US. This also gives a clear indication of the different bases of German GAAP from those of US GAAP and IAS (IFRSs) which belong to the Anglo-American model. The high influence of the Anglo-American model on IAS is debated in Chapter 4. The characteristics of German accounting suggested by these classifications are discussed below.

Table 3.1: Germany in Classification Studies

Study	Criteria	Classifications
Choi and Muller (1992)	Economic and political factors	**Germany:** Macroeconomic[42] and Uniform **Anglo-American:** Independent discipline
Seidler (1967)	Zones of influence	**Germany:** German-Dutch zone **Anglo-American:** British zone- US zone[43]
Gray (1988)	Cultural influences	**Germany:** moderate professionalism, marginal uniformity, marginal conservatism and strong secrecy **Anglo-American:** strong professionalism- strong flexibility- strong optimism, strong transparency
Puxty, Willmott, Cooper and Lowe (1987)	Source of Regulation	**German regulation**s: legalism predominant **The UK:** principally associationist **The US:** element of legalism and associationism.
Nobes (1980)	Different economic and political factors	**Germany:** Macro-uniform, government driven, tax dominated, statue-based **Anglo-American:** Micro-fair-judgemental, commercially-driven, business practice, profession rules, British origin[44]

Source: based on information in Nobes and Parker (2000), Gordon, Roberts and Weetman and Gordon (1998)

3.3 Nobes' influential factors:

Nobes (ibid.) suggests that there is a group of factors which have a direct influence on the financial reporting environment and cause international differences. Four of these factors seem to be relevant to the German accounting environment: legal system, providers of finance, taxation and the profession[45]. This section, will explain this very briefly with the intention of contrasting the impact of these factors on German accounting with that in the UK and US. Furthermore, this may be to a large extent consistent with four key sources of authoritative regulation on German accounting, suggested by Macharzina and Langer (2000): commercial law; tax law and rules; accounting practice; and the profession.

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[42] The term 'Macro' is used to indicate the role of the government in the process of standard-setting.
[43] criticized for putting these two system in different zones (Nobes and Parker, 2000)
[44] At this point, each of them go in a different cluster: while the UK falls in the UK influence with Professional regulation group, the US falls in the US influence with SEC enforcement group
[45] The rest of the influence factors are: Inflation, Theory and Accidents of history. According to the explanation provided by Parker and Nobes (ibid), the role of these factors in Germany is not significant.

3.3.1 Legal systems:

Nobes (ibid, p.19) distinguishes between two types of legal system: common law and codified law. Germany has a code law system which is based on Roman law, whereas the UK and U.S. have a common law system. In a codified system "company law or commercial codes need to establish rules for accounting and financial reporting". Germany was the example used by the authors for such system. Gordon et al (1998, p.275), for example, state that German accounting practice is "strongly contained in law". The common law, conversely, does not set down detailed rules to guide companies in the preparation of financial statements. Section (3.5) about Commercial Law shows clearly how German accounting is extensively regulated by law.

3.3.2 Taxation:

In countries such as the UK, and US, tax laws do not have any significant influence on accounting practice. In Germany, on the other hand, the link between taxation and accounting is very close (Gordon et al, 1998). This close link between taxation and commercial accounting in Germany is represented by a principle called the "*Massgeblichkeitsprinzip*". A later section below explains in detail different aspects of this complex relationship.

3.3.3 Profession:

It is clear from the classification of Gray and from the explanation presented in a later section below that the German profession has a smaller role than that in the UK and US. Still, the strength of this role is debatable.

3.3.4 Providers of finance:

It is explained in Chapter 2 that the size of German stock market is relatively small compared with the UK and US. This was reflected in terms of the number of listed share, market capitalization and market capitalization as a percentage of GDP.

It was also explained that Germany has a bank-dominated economy. However, the dominance of banks is not the direct result of extensive bank lending. Chapter 2 explained that bank lending in Germany is not as large as one would expect, although it may be important for small and medium sized firms (Edwards and Fischer, 1994). Apart from bank lending, German banks can dominate firms through

proxy voting and shareholding (see Chapter 2). Because of this, Gordon et al. (1998, p.279) indicate that "it would not be unusual for the banks collectively to control more than half of the votes cast at an annual general meeting of a major German company". Another important characteristic of the pattern of shareholding in Germany is that the largest proportion is held by non-financial institutions (see Chapter 2). Roberts et al (ibid) explain that in such situation cross holdings are often found, where firms own stakes in each other. Furthermore, they argue that, although this makes companies secure against takeover, it elevates 'secrecy' (see Chapter 5).

Nobes (ibid), on the other hand, classifies Germany amongst credit-insider systems, as opposed to the UK and US, which are classified as equity-outsider systems. They argue that being a credit-insider system implies that there is no important market demand for audited and published accounts. They further argue that in such a system, the demand for accounts is largely for tax purposes.

In short, one can say the traditional German corporate financing has encouraged a creditor-protection orientation (conservatism) and a lack of transparency (secrecy), although this has changed and is changing (further discussion provided in Section 3.7).

In fact, by having a closer look at the developments of German regulations since 1998, it can be clearly seen that the importance of the German stock market, and consequently related accounting regulations and practices, has increased. This is demonstrated in several sections either in this chapter or the previous one.

3.4 German accounting Regulation:

Although German law is highly codified and prescriptive, German accounting regulations have other sources other than Commercial Law and Tax Law. Other potential sources are: German accounting standards (GASs), Interpretations of the IdW and firm-specific rules. In addition, there is the important concept of GoB (discussed below) and the impact of the European Directives. Although this section presents detailed explanations of the role of commercial law and taxation, its scope is also extended to cover other sources.

3.4.1 Hierarchy of the German regulations of financial reporting:

It can be seen that German regulations for financial reporting are different from each other with respect to factors such as their authoritativeness and their level of detail. Ordelheide (1999) presents a useful diagram to cast light on the hierarchy of the German accounting regulation, which is reproduced below in Figure 3.1:

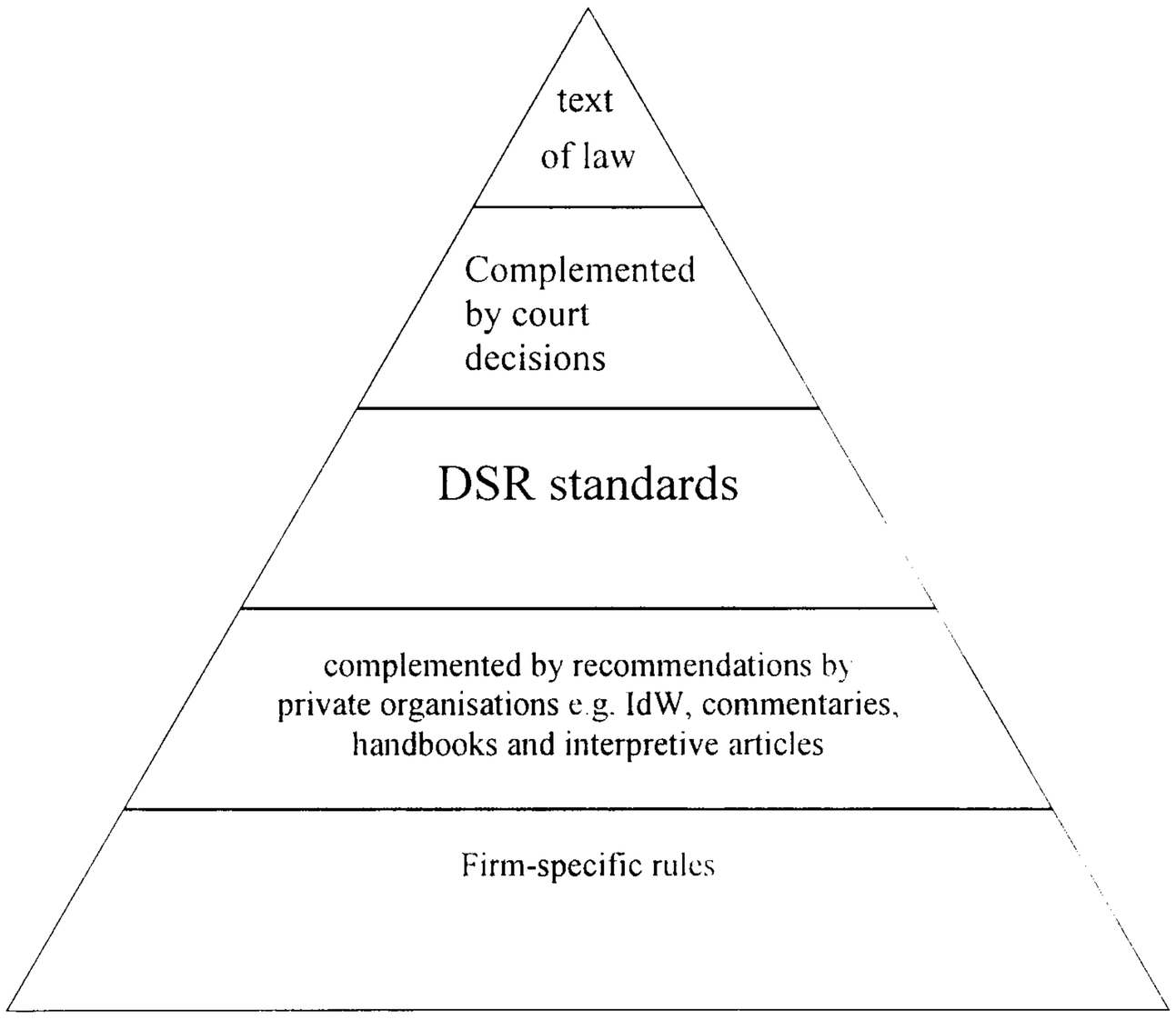

Figure 3.1: The pyramid structure underlying the system of accounting regulation in Germany Source: Ordelheide (1999)

According to Ordelheide (ibid. p. 107), there are three features of this pyramid:

1. Rules become more detailed and specific as one descends through the different levels. Short and unclear rules established at a specific level are developed in the following levels.
2. The rules from the second level downwards gain their authority from the law, so that they may be considered as interpretations. However, the rules at the second level have legal authoritativeness. Apart from the accounting standards GASs, all rules issued at the lower levels "have expert authority only".

3. Responsiveness to change lessens at the upper levels. Example of this is when a new accounting issue arises or "if a change in the established rules is strongly advocated", the firm-specific solution has to be found immediately and to be consistent with the law.

3.5 Commercial Law

The fact that Germany has a codified and prescriptive law has a predominant influence on accounting in Germany (Gray and Radebaugh, 2002). Furthermore, one important characteristic of German accounting regulation is "the legalistic system of rules" (Pfaff and Schröer, 1996, p.973), which means that accounting rules are mandated by law or the courts.

Since they were first established in 1794, German accounting regulations have been reformed and changed several times over the last two centuries influenced by historical economic and political developments. Table 3.2 shows a summary chronology of the establishment and developments of the accounting legislations:

Table 3.2: Development of German Accounting Regulations

Year	Law
1794	Prussian Civil Code
1861	General German Commercial Code (ADHGB)
1870	Stock Corporation Act (*Aktiengesetz*, AktG)
1874	Formal recognition of commercial accounts as the basis of tax accounting
1884	Amendment of Stock Corporation Act (AktG 1884)
1892	Limited Liability Companies Act (GmbHG)
1896	Stock Exchange Act (*Börsengesetz*, BörsG
1896	Stock Exchange Listing Act (BörsZulG)
1897	Commercial Code (*Handelsgesetzbuch*, HGB)
1899	Co-operatives Act (GenG)
1931	Stock Corporation Emergency Decrees (*Aktienrechtsnotverordnung*)
1937	Stock Corporation Act amended (AktG 1937)
1965	Stock Corporation Act amended (AktG 1965)
1969	Disclosure Act (*Publizitätsgesetz*, PublG)
1985	Commercial Code amended (HGB 1985)
1987	Stock Exchange Act amended (BörsG)
1998	Commercial Code Reform Act (KapAEG)
2002	Fourth Financial Market Reform Act (2002)

Source, Ordelheide and KPMG (2001), except for the last point[46]

[46] Added from Leuz and Wüstemann (2004)

Historically the accounting regulations in Germany have been influenced by the French Ordonnance de Commerce (1673) and Code de Commerce (1807) (Haller. 1998).

The Prussian Civil Code of 1794 was the first law to include comprehensive accounting requirements. These requirements were mainly concerned with the valuation of inventory and the balance sheet in the event of bankruptcy (Ordelheide and KPMG 2001). Moreover, it is the root of the conservative interpretation of principles of realization and of lower of cost or market in Germany (Haller 1998).

The General German Commercial Code (ADHGB) (1861) described by Ordelheide (1999, p. 101) as "a part of the process of political integration of the German states which resulted in a unified Germany in 1871". This law required each business in Germany to draw up a balance sheet. In addition to that, it includes some valuation rules for current assets and fixed assets. The Stock Corporation Act (1870), on the other hand, introduced the first disclosure rules for financial statements. Furthermore, the reform of 1884 set down the foundation of a valuation system based on prudence emphasising the concept of capital maintenance, and introducing some prudent provisions such as historical cost for all assets. In 1892, the limited liability company was established by the Stock Corporation Act, which also required the application of the historical cost principle to fixed assets. The Commercial Code of 1897 obliged non-corporations[47] to follow the principles of proper bookkeeping (GoB), and to provide a balance sheet (Ordelheide, 1999).

As a result of the worldwide crises of the late 1920s when a large number of companies went bankrupt, a major reform in the Stock Corporations Act took place in 1937 which was preceded by an emergency decree in 1931. By these two pieces of legislation, the historical cost system of accounting was further developed. Moreover, the capitalisation of formation expenses, capital issue costs and self produced goodwill became illegal (Ordelheide and Pfaff, 1994, p.85). These last developments are very prudent measures which reinforce the conservatism of German accounting (see below).

The first obligation to prepare, audit and publish group accounts was established by the extensive reform of the Stock Corporation Act in 1965. One of the important

[47] Corporations include: Joint Stock Corporations (AGs), Limited Partnership with shares (KGaAs) and Limited Liability companies (GmbHs).

aims of this reform was to limit management's opportunities to create hidden reserves. This was accomplished by "specifying the values to which assets should be depreciated (compared with acquisition and production costs" and by restricting the use of provisions (Ordelheide and KPMG, 2001, p. 1226). Beside that it set down new formats for the balance sheet and the profit and loss account. This law was the sole codified source of detailed accounting regulations in Germany until the amendment of the Commercial Law in 1985 (Haller, 1998). The Disclosure Act (PublG) 1969 required the preparation of financial statements by large sole proprietors, commercial partnerships and GmbHs (of any legal form other than AGs and KGaAs[48] (Ordelheide and KPMG, ibid))[49]. Moreover, this requirement was accompanied with accounting rules broadly similar to those upon AGs (Ordelheide and Pfaff, 1994).

3.5.1 Introduction of the European Directives:

in response to the European efforts to harmonise accounting practices between the member states, the 2nd, 4th, 7th and 8th European Directives were incorporated into German Commercial Law in one go in 1985. Table 3.3 is presented simply to show the main matters dealt with by these directives and their relevance to accounting practices:

Table 3.3: Main matters dealt with by the European Directives: 2nd, 4th, 7th and 8th

Directive	Main matters
2nd	Naming of companies, the minimum capital requirements of public companies, and the definition of distributable profit
4th	Defining annual accounts, true and fair view, consistency, details of formats for financial statements, detailed valuation and disclosure requirements[50]. Financial firms are included in special versions of this Directive
7th	Consolidation of financial statements and related valuation and disclosure rules, as will as, treatment of goodwill
8th	Qualification and work of auditors

Source: produced by the researcher using data from different resources[51].

[48] See Glossary for definitions of legal forms of German firms.
[49] Until the year 1969, the only companies required to publish financial statements are AGs and KGaAs.
[50] Examples are articles 43 to 46 which require large number of disclosures required in the notes to the accounts.
[51] The reference cited in the text below

It can be seen from Table 3.3 above that the 4th and 7th Directives are of particular importance to accounting. Although the main aim behind issuing European Directives such as the 4th and 7th is European accounting harmonisation. German legislators, when implementing these directives, allowed national choices and discretion in the transformation (Leuz and Wüstemann, 2004), although this is also true for other member states. Consequently, this discretion in the implementation of the European Directives left significant differences in accounting measurement between European countries (Joos and Lang, 1994). Van Hulle (2004) indicates that Germany, in particular, has encountered serious difficulties in applying the Directives, because small and medium firms were against making their financial statements public. Furthermore the impact of taxation on German accounting led to a very conservative transformation of the 4th Directive (Haller, 1992). It is also important to note the incorporation of the true and fair view in the 4th Directive was one of the significant issues strongly related to the introduction of this Directive into German Commercial Law. (Section 3.5.6 below is devoted to discussing this issue).

3.5.2 Reforms of 1998:

As described by Ordelheide and KPMG (2001, p. 1360), the reform of 1998 Kapitalaufnahmeerleichterungsgesetz (KapAEG) was "a reaction to the internationalization of financial reporting and the critics of the German corporate governance". Furthermore, Leuz and Wüstemann (ibid) indicate that German firms have become capital importers and as a result of that they had to respond to the international need for reliable public information. This reform introduced three important changes in the German accounting environment. First, it allowed German listed corporations to adopt US GAAP and IAS in preparing their consolidated accounts. Nowak (2004) indicates that this law relieves firms listed on US exchanges of the obligation to prepare two sets of financial statements. Second, according to this reform, German firms were for the first time required to prepare a Cash Flow Statement. Finally, the 1998 reform has passed another significant milestone in the history of the German accounting legislation which is the establishment of the

German Accounting Standards Board (GASB)[52]. Detailed explanation about the introduction of IAS and US GAAP and related issues is provided in Chapter 4.

*3.5.3 Principles of proper bookkeeping (***Grundsätze ordnungsäßiger Buchführung-** ***GoB):***

It is important at this stage of discussion to try to define the so called GoB. The Commercial Code (HGB) states that financial statements should be prepared according to principles of proper bookkeeping (*Grundsätze ordnungsmäßiger Buchführung*-GoB). The code of 1897 was the first to make reference of the GoB (Ordelheide 1999).

As there is no legal definition of GoB, there is a debate on what this concept embraces. Bonthrone (2000) indicates that it is misleading to refer to GoB as "German GAAP"; nevertheless he states that it is the nearest thing Germany has to GAAP[53]. Leuz and Wüstemann (ibid), on the other hand, define it as "German GAAP". They suggest that German GAAP comprises the legal rules, principles and the standards employed by a firm in preparing its financial statements. According to Baetge et al (1995, p. 93), the GoB used in financial reporting have been developed over time as a consequence of "teachings, practice and administration of justice". Furthermore, they also indicate that although "they may supplement the law, they do not replace it". Finally, Haller (1998) thinks that it is a misunderstanding to interpret GoB similarly to US GAAP. He argues that the German GoB comprises only non-codified rules produced through accounting practice, whereas the US GAAP comprises the entire set of accounting rules and principles. Ordelheide and KPMG (ibid, p.1244) provide a list of accounting conventions calling them "narrowly defined" GoB: Revisability[54], Completeness, Materiality, Accuracy, Continuity, Clarity, and Pagatoric values (accruals)[55] (see also Ordelheide and Pfaff, ibid). Furthermore, McLeay, Ordelheide and Young (2000) state that legally authoritative interpretations of Commercial law combined with non-authoritative legal interpretations form *GoB*. They explain that the legally authoritative interpretations

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[52] It is also referred to as German Accounting Standards Committee (GASC), while the German name is Deutsches Rechnungslegungs Standards Committee (DRSC).
[53] For the purposes of this study, the researcher has chosen to use the term "German GAAP" with a similar scope to that explained above.
[54] Auditability which means that the books should allow experts to gain an insight into the business transactions and financial position
[55] Income and expenses of the financial year must be taken in the financial statements regardless of the date of the payments to which they relate

are produced by tax courts, especially in areas on which Commercial Law is not exhaustive, such as foreign currency translation. This may seem to be another narrow definition of *GoB*.

The researcher will use the definition given by Leuz and Wüstemann (ibid), as the term German GAAP is used in this study to mean all the accounting principles used in preparing financial statements regardless of whether they are codified or not. To argue for this, one may say that the legislators require financial reporting in accordance with *GoB*, while they know that the majority of German accounting principles are codified. One important point about *GoB* is its relationship with the true and fair view principle which is discussed in a later section. However, it may be useful here to indicate that one common thing between the two concepts is the vagueness of their definitions.

3.5.4 Taxation:

It is widely known that the tax laws in Germany have had significant impact on the development of the German accounting principles. It may also be important to indicate that the influence of these laws on accounting practice has been stronger that of the accounting profession (Watts, 1996).

The link though which the tax laws affect German accounting is the so called "*Massgeblichkeitsprinzip*" or the 'authoritative principle' [56]. Although the authoritative principle can be traced back to the 19th century, it was first established in the Tax Code in 1934 (Haller, 1992). In accordance with this concept, asset comparison and computation of income for tax purposes has to be according to the generally accepted commercial accounting principles (GoB) (ibid).

Pfaff and Schröer (1996) explain that the authoritative principle has two implications: 'material' and 'formal' authoritativeness. The 'material' side implies that the commercial law is authoritative for the tax accounts as long as it is consistent with GoB and is not against any particular tax rules. The 'formal side', on the other hand, implies that it is not only the Commercial Code and GoB[57] which are binding but also the actual accounts. In other words, the substantive basis for calculating taxable income is the actual balance sheet.

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[56] As translated by Pfaff and Schröer (1996), and Nobes and Parker (2000); whereas Haller (1992) uses the "principle of congruency"

[57] This would include the commercial accounting law as defined later.

In a few particular cases, the tax laws require different treatments from those required by the commercial law and GoB. This is mainly in the area of recognition and depreciation. To avoid treating these differences in a separate set of accounts, a large percentage German firms (90 % of limited liability companies) prepare the same accounts for both financial and tax purposes. However, listed firms, in general, prepare two sets of accounts (Pfaff and Schröer, ibid).

3.5.4.1 The reverse authoritativeness principle:

It is explained above that commercial accounting has its impact on tax accounting. However, tax accounting can have its influence in the opposite direction though the reverse authoritativeness principle (*Umkehrmaßgeblichkeit*) (Ordelheide and KPMG, 2001). According to this principle, options in tax law which give tax advantages can only be used if they are also used in the commercial accounts. Examples of such options are the accelerated depreciation and tax-exempt reserves.

The relationship between German accounting and taxation can be summarized into three main points:

- Commercial accounting is accepted by tax authorities when accounting options used are not against any specific rules.
- Using accounting options which are not consistent with tax accounting rules leads to the production of two different sets of financial statements (the case of listed firms).
- Using options from the tax code which give tax advantages is conditional upon incorporating them in the commercial accounts.

3.5.4.1.1 Effects of the authoritative principles:

It is widely known the authoritative and reverse authoritative principles have had significant impact on the financial reporting. Haller (1992) classifies this impact into two main streams: direct and indirect effects. Below is a diagram which summarises these effects followed by short explanation of each of them:

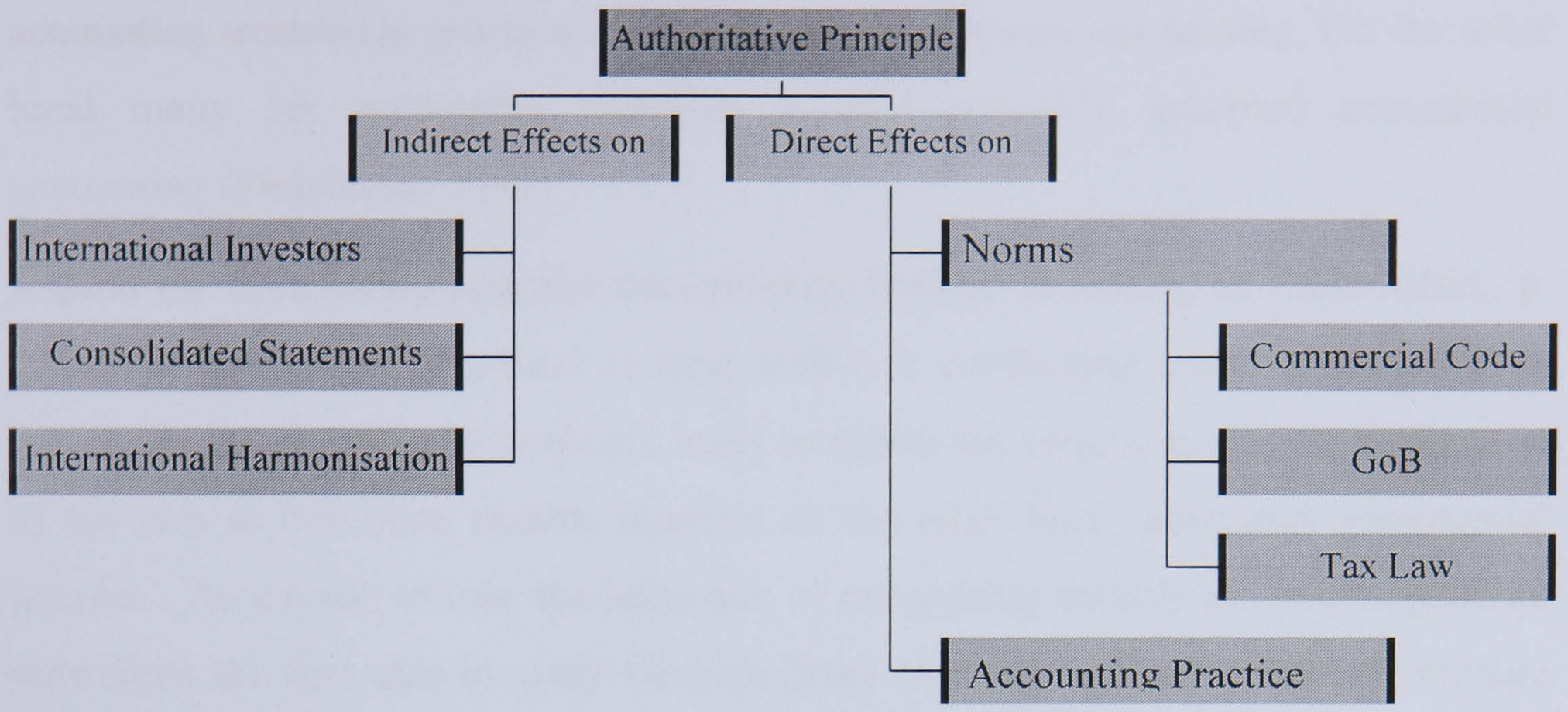

Figure 3.2: Direct and indirect effects of the Authoritative Principle

Source: Based on a diagram by Haller (1992) with a few adjustments

3.5.4.1.1.1 Direct effects:

Impact on Tax Law: with the exception of the area of depreciation and write-offs, the Tax Code does not include major accounting regulations and it is tied to commercial accounting. According to Haller (ibid.), this causes judicial rulings to play a principal role in establishing tax accounting rules by interpreting GoB in deciding doubtful cases. This may indicate that guides to German accounting are largely based on the law and on tax cases, whereas Anglo-Saxon guides are largely based on accounting standards.

Impact on Commercial Law: One important impact of this principle is the very conservative transformation of the 4th Directive in Germany. Haller (ibid) explains this by the contradiction between the implications of the authoritativeness principle and those of the true and fair view (see below). Söderblom (2001) also supports the point of view that the significant tax influence had a negative effect on the incorporation of the true and fair view into German law. Furthermore, Pfaff and Schröer (ibid) indicate that after WWII, the reverse authoritativeness principle led to the increasing introduction of tax-driven procedures in commercial accounts. This, in turn, had an influence on the reform of the Stock Corporation Act in 1965, where the some of these procedures have been embodied into the law.

Principles of Proper Bookkeeping (GoB): it suggested that the impact on GoB is dual. The interpretation of GoB made the tax courts decide whether certain accounting treatments practiced can be accepted as proper accounting. On the other hand many tax accounting practices became generally accepted commercial accounting (Ordelheide 1999).

Impact on Accounting practice (Accounting Policy): according to Haller (ibid., p. 321), German companies have to deal with two conflicting aims "a desired high income in the commercial accounts leads to higher tax payments and the realization of the aim to minimize taxable income, on the other hand, decreases commercial income". As a result of this, the latter aim of minimizing taxable income, in general, outweighs the first aim in many German firms. Another is that in order to prepare one set of financial statements, firms ignore any recognition and valuation policies which are not permitted by the tax law (Ordelheide, ibid.).

3.5.4.1.1.2 Indirect effects:

Decisions of international investors: the authoritativeness principle is considered to be a major cause of undervaluation and the very conservative computation of income in German accounting, resulting in lower numbers for distributable earnings. This affects investors in two negative ways: first, it makes it difficult for them to interpret the actual financial position of a company and its financial position. On the other hand, low earnings do not promise high dividends. Haller (ibid) thinks that this is a main reason that international investors are reluctant to invest in Germany and a main reason for high gearing.

Increasing Importance of Consolidated Accounts: according to Haller (ibid), consolidated financial statements are not the basis for taxes or dividend payments. They can be drawn up on a pure commercial accounting basis. Therefore German consolidated accounts are considered to be much more informative than individual accounts. However, Ordelheide (1999) refers to the fact that according to HGB (§300 and § 308), valuation and recognition of assets and liabilities in the group accounts must be based on the same rules used by the parent company in its individual accounts. On the other hand, one should notice that the reverse authoritativeness principle does not apply to the group accounts when there is conflict between the rules of tax accounting and those of financial accounts. Yet, if a company made use of tax rules in preparing its group accounts, it is required to give

additional information in the notes to the accounts in order to make it possible to reconcile them with those which would have been produced in accordance with the Commercial Code only (Ordelheide and KPMG, 2001).

International Harmonisation of Accounting: Haller (ibid, p.321) explains that Germany was reluctant and resisted the incorporation of the true and fair view in the 4th Directive, simply because of the conflict between this principle and the influence of tax accounting rules on financial reporting. However, Germany succeeded in including regulations in the 4th Directive which recognise the interaction between the two types of accounting and to make the directive, "as far as possible, tax neutral". Furthermore, he argues that the strong influence of the authoritativeness principle led to breaching of the rules of the 4th Directive (such as the prohibition of valuation with present values and prohibition of capitalization of R&D). The influence of tax on German accounting has certainly been a barrier to harmonisation and it should be noted that all current harmonisation efforts are based on group accounts, which have no tax consequences. (See below for true and fair view; see also Chapter 4 for more about the position of Germany in international accounting harmonisation)

3.5.4.2 The role of the BFH:

The Federal Fiscal Court (*Bundesfinanzhof-BFH*), which is the highest tax court, has an important role in passing judgements in accounting matters raised in lawsuits between legal persons under civil law, where commercial accounting law is rarely relevant (Pfaff and Schröer, ibid). The explanation of this is that the BFH plays a supportive role for the authoritativeness principle. This court plays a crucial role in interpreting the GoB in relation to the concept of the true and fair view. As explained above, the vast majority of small and medium sized firms prepare only one set of financial accounts for both purposes (commercial and taxation). The tax court has therefore a vital role in deciding whether these statements are in accordance with GoB or not.

*3.5.5 Standards of the German Accounting Standards Board (*Deutscher Standardisierungsrat, *DSR):*

In order to establish a framework for bringing German accounting and financial reporting in line with international principles, The German Government in 1998 requested the establishment of a privately organised institution (GASC, 2004). As a

result of this, the German Accounting Standards Board (GASB) was established, modelled on FASB as a private-sector standard-setting body made up of seven independent accounting experts in the areas of auditing, financial analysis, academia and industry (Ordelheide, 1999). In September 1998, the GASB was recognised by a contract with the Federal Ministry of Justice (FMJ) as a private accounting body within the meaning of §342 of the HGB. The operating body of GASB is the German Accounting Standards Committee (GASC, *DRSC*[58])

The following is a summary of the main aims of the GASB as stated by Nowak (2004):

1. Introducing and financing the process of standard-setting by an independent body of experts and along Anglo-American and International models.
2. Developing accounting standards to meet needs in the area of consolidated financial reporting (group accounts).
3. Participating in the international harmonization of accounting in cooperation with all the international and intergovernmental organizations concerned with this process.
4. Consultation on the development of German accounting regulations.
5. Representing Germany on international standardization committees.
6. Promotion of academic accounting research.

The standards are published by the Ministry of Justice and once they are published, "the standards will conjectured to have the standing of principles of proper bookkeeping for group accounting (*GoB*) [59]" (Ordelheide, 1999, p.111). The auditors, on the other hand, should testify to proper application of GAS. Deviation from a GAS can be only justified by a statement that this deviation is required to comply with *GoB* (Ordelheide and KPMG, 2001).

By July 2004, the GASB had issued 14 German Accounting Standard (DSR; GAS[60]). Table 3.4 presents a summary of these standards:

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[58] Deutsches Rechnungslegungs Standards Committee
[59] this means that they are given legal status, unlike UK standards
[60] the equivalent abbreviation in English (German Accounting Standard)

Table 3.4: A list published German Accounting Standards as at date

GAS	Subject	Published[61]
GAS 1	Exempting Consolidated Financial Statements	July 2000
GAS 2	Cash Flow Statement	May 2000
GAS 3	Segment Reporting	May 2000
GAS 4	Acquisition Accounting in Consolidated Financial Statements	Dec 2000
GAS 5	Risk Reporting (by different types of financial entities)	May 2001
GAS 6	Interim Financial Reporting	Feb 2001
GAS 7	Group Equity and Total Recognized Results	April 2001
GAS 8	Accounting for investments in Associates in C. F. S[62]	May 2001
GAS 9	Accounting for investment in joint Ventures in C. F. S	Dec 2001
GAS 10	Deferred Taxes in Consolidated Financial Statements	Apr 2002
GAS 11	Related Party Disclosure	Apr 2002
GAS 12	Non-current Intangible Assets	Oct 2002
GAS 13	Consistency Principle and Correction of Errors	Oct 2002
GAS 14	Currency Translation	N P[63]

Source: prepared by the researcher based on information in DRSC (2004)

The majority of these standards have different versions published specially for financial institutions. This casts light on the importance of these sectors in the German stock market.

Given the fact that the GASB is still relatively new, the number of standards issued so far seems to be reasonable. In addition to those published, there are few drafts which are still under discussion[64]. Leuz and Wüstemann (2004) indicate that the GASs are mainly concerned with disclosure issues or questions of recognition. They also indicate that it is still early to pass judgments on these issues. Furthermore, Leuz and Wüstemann (ibid) raise the question of whether it will still be necessary to have this body after the incorporation of IAS into European accounting law. This question does not consider the needs of unlisted firms. In fact, the question about the prospective role of DRSC after the year 2005 may also apply to standard-setters in all member states of the EU.

German standards and related issues are discussed in more detail in Chapter 4 when compared with IAS and US GAAP.

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[61] The publication of the first version by the Federal Ministry of Justice (FMJ)
[62] Stands for consolidated financial statements
[63] submitted to the FMJ in Aug 2003 but it had not been published until Mar 2003
[64] According to www.drsc.de

3.5.5.1 Enforcement of the accounting standards:

Although the German standard-setting body was established in 1998, a legal mechanism to enforce its standards came into being only in 2004 with the establishment of the Financial Reporting Enforcement Panel (FREP). Although it does not have authority to impose any sanctions. it is there to discover any violations of financial reporting requirements by listed firms including IFRSs (Deloitte and IAS Plus, n.d.).

However, apart from the expected role of FREP. Leuz and Wüstemann (ibid) indicate that corporate governance has an important role in the enforcement of accounting rules (explained below). They also indicate that pressures of enforcement can result also from different parties such as tax authorities (especially in issues of valuation and recognition) and the registration department of stock exchanges (such as that of FWB).

3.5.6 The True and Fair View in German Accounting:

One of the most important issues related to the implementation of the European Directives in continental Europe is the introduction of the 'true and fair view principle' (hereafter TFV). Although a substantial body of literature has been produced during the last decades about TFV (Nobes, 1994), only its relationship with German accounting will be considered here. As discussed below, this issue is of particular importance to Germany. This is simply because of the fact that prior to the integration of the 4th Directive, Germany had had no experience at all with the TFV (Ordelheide, 1993). This concept was introduced through article 2(3) of the 4th Directive which states that: "The annual accounts shall give a true and fair view of the company's assets, liabilities and financial position and profit or loss."

Although it is not within the scope of this discussion to define the concept of TFV, one should point out that one of the issues raised around the introduction of TFV in Europe is that there is no universal agreement on the definition of TFV and its interpretation (Söderblom 2001). However, this concept can be argued to be the strongest influence that British accounting had on the EEC Directives. Ordelheide (1993, p. 81) distinguishes between two different concepts of TFV: the TFV principle and the European TFV. He states that the TFV principle is "what British accountants declare it to be", whereas the contents of European TFV 'at that

moment' are the accounting principles and valuation rules included in the 4th Directive.

The way Germany responded to TFV is by increasing disclosure rather than moving away from the uniformity required by both the commercial and tax laws (Watts, 1996). As previously explained, the influence of the Commercial Code and the Tax Law is shown in detailed legal rules and the narrow scope for flexibility or judgement caused by the authoritativeness principle. According to Alexander (1993), for example, published accounts in Germany prepared on tax bases (under the influence of the authoritativeness principle) would not be considered by UK accountants as presenting a TFV. Ordelheide (ibid, p.84), explains in line with the so called 'separation thesis':

"Accounting according to the TFV principle can be different from accounting according to GoB, and that in case of differences additional information in the notes is sufficient in order to establish a TFV".

Yet, Haller (1992) indicates that the notes cannot totally cure the information distortion caused by the authoritativeness principle. Haller (ibid) relates this to two reasons: first, because the information provided by these notes has no material impact on the results of the commercial accounts; second, experience of the past years shows that companies do not interpret these disclosure rules in their proper sense. Furthermore, the information usually provided on the effect of the authoritativeness principle is often very brief and incomprehensible, especially for those who do not have knowledge of German tax laws.

One important issue about absorbing the true and fair view into German legislation is the omission of the true and fair override. This is, in fact, an important concept in the British TFV, which requires companies to break the law and accounting standards in order to give a TFV, based on professional judgment. In conclusion, German TFV is more about compliance with rules and some additional disclosures than it is an overriding principle of German accounting, which remains firmly attached to prudence.

3.6 The role of the Profession:

Despite some recent developments, the role of the accounting profession is still relatively small compared with that of the tax rules or with the profession in the UK

or the US (Macharzina and Langer. 2000). Furthermore. it can be seen above that Gray (1988) classified Germany as having moderate professionalism, as opposed to strong professionalism in the UK and US.

One approach to identifying the factors which may have led to this smaller role is to compare the German accounting profession with that of the UK. The main German professional body, the Institute of Auditors (*Institut der Wirtschaftsprüfer in Deutschland e.V.,* IdW), was formed in 1931. Britain, on the other hand, was the first country in the world to establish and develop an accountancy profession body in the 1850s (Parker, 2000). Furthermore, the requirement to audit all but small limited liability firms became only compulsory in 1985 with implementation of the 4th Directive. The number of members of the IdW (*Wirtschaftsprüfer*) is around 9611 (ACCA, 2001), whereas some 150000 accountants in the UK belong to professional bodies and have the power to audit (Watts, ibid). However, these figures should be interpreted cautiously, because not all the qualified accountants in the UK are currently in practice while the German accountants cannot be members of IdW unless they are in practice (ibid).

A second important body in Germany is the Chamber of Auditors (*Wirtschaftsprüferkammer*), which was formed by law in 1961. While, the vast majority (86 %) of auditors are voluntarily members of IdW, every auditor must be a member of the *Wirtschaftsprüferkammer* (Macharzina and Lange, ibid). The role of this chamber imposed by law is to observe professional standards and to educate accountants. However, the *Institut der Wirtschaftsprüfer* takes the main part of this task by educating members and protecting their interests (Nobes, ibid). One important advantage of the German accounting profession is the high educational standards its members[65] (Watts, ibid). As a result of the number of years of supervised practice most individuals are not admitted to fully licensed practise before the age of thirty. Another professional body of auditors which belong to the *Wirtschaftsprüferkammer* is the so called *Vereidigte Buchprüfer* (vBP). They have lower qualifications and are only allowed to audit private limited liability firms (GmbH) (Haller, ibid.). Another potential factor which may underlie the limited role of the profession is the very detailed accounting laws and the role of the tax courts.

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[65] According to Haller (1998, p. 87) "a university degree in business administration, law, general economics or similar subjects; 5 years of practical experience (including at least four years as an auditor)" , alongside a written and oral examination.

This might have left a smaller area for the profession to innovate and contribute in this field. McLeay, Ordelheide and Young (2000, p.84) report that as a result of the codified approach to regulation in Germany, the process of developing accounting rules was mainly directed by the Ministry of Justice. They also indicate that in contrast with the Anglo-American model, the audit profession had a minor role, "concerned with clients' compliance with the law rather than the development of binding accounting principles and procedures"

Gordon et al (1998), on the other hand, explain that the profession in Germany has a significant impact in moderating strong statutory control. Although the two professional bodies do not have the power to develop mandatory accounting rules, they still have an indirect influence. For example, the IdW has an important role in the interpretation of legal provisions which are written in the form of general principles and require detailed explanation. Although the interpretations provided by this Institute have practical importance, they are not legally binding (Ordelheide 1999). Haller (ibid), in turn, indicates that the recommendations of IdW can obtain authority from court decisions (Haller, ibid). Moreover, Gordon et al (ibid) argue that professional interpretations provide a large number of options which may imply more flexibility in German accounting. It can be understood that these interpretations are to some extent similar to those produced by the BFH. A third source of such interpretations is the large market for information. According to Ordelheide and Pfaff (1994, p89), the main sellers in this market are experts from business, the public sector and academia. Buyers, on the other hand, are the publishers of specialist journals, book publishers, and business and other organizations as indirect consumers. They also indicate that firms of accountants participate in this market, where many commentaries on accounting law are produced by members of the larger accountancy firms.

Ordelheide and Pfaff (ibid, p.89) indicate that important contributions by the German profession can also be made through statements and recommendations produced by the working party on external company accounting of the Schmalenbach Society and German Association for Business Economics (*Schmalenbachgesellschaft/ Deutsche Gesellschaft für Betriebswirtschaft*[66]). In addition to this, they also report that

[66] A body with a membership of 1,600 German economists and managers intent on promoting the exchange of ideas between microeconomic research and practice (Glossary on www.Bayer.com, 2004)

professional associations of particular industries. such as. "the Economic Committee of the Chemical Industry Association" produce statements on accounting matters which have useful relevance, particularly for the industry concerned.

McLeay, Ordelheide and Young (ibid, p.96) identify. three main lobby groups which worked actively in the transformation of the 4th Directive into German Commercial Law: industry, auditors and academics. Through their empirical work. the authors find that a key feature for the success of law making is agreement between these three groups, with the academics making a significant contribution. Furthermore, they also conclude that

> "with the exception of the levels of lobbying activity observed for the academic constituency , the active groups display a remarkable similarity to those documented for the US and similar regulatory regimes".

The authors indicate that German accounting academic have a significant role relative to the levels observed in the US which is, to some extent, explained by the active market for legal interpretations in Germany (see above).

However, the preparer viewpoint was also represented in lobbying activities by the Association for Finance and Management and the Combined Association of German Industry. Preparers' proposals were published in the Journal *Der Betrieb*", the same journal in which auditors publish their commentaries on new regulations[67]. One important thing is that the composition of GASB reflects the consensus between these three lobbying groups in addition to a financial analyst.

3.7 Main features of German accounting:

German accounting has its peculiar features which have been the result of the interaction of several factors. Macharzina and Langer (2000, p. 229) present a list which contains several features of German accounting principles:

- a strong tax influence
- a large number of options regarding the recognition and valuation of assets
- regulated accounting for private companies and partnerships which provides a greater range of accounting alternatives (unlike the UK and US)

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[67] The auditors publish at first in Der Betrieb but later in *Die Wirtschaftsprüfung*

- "subordination of the 'true and fair view' concept to compliance with the individual provisions of law"
- "ongoing development of accounting principles, primarily by tax courts"
- the moderate influence of the German accounting profession on the development of accounting principles, compared with the UK and US
- "The opportunity to control net income in a way disguised from readers of financial statements" (income smoothing).

It can be seen that some of these features are discussed above within a different framework[68].

However, one useful approach to study the main features of German accounting is by using Gray's dimensions which are presented in Figure 3.3 and 3.4 below. Yet, only three of the four dimensions presented in these figures and stated in Table 3.1 can be used to describe accounting practices: conservatism versus optimism, uniformity versus flexibility, and secrecy versus transparency (Gordon et al. ibid [69]). Furthermore, some concepts related to these characteristics (such as creditor protection) are of significant importance to German accounting and are explained in detail where appropriate.

3.7.1 Conservatism versus optimism:

It is widely known that German accounting is strongly influenced by the prudence principle and usually described as conservative (Schultz and Lopez, 2001). As stated in Table 3.1 above and as shown in Figure 3.2, German accounting was classified by Gray as moderately conservative. However, some aspects of German accounting, such as the way in which profits are distributed, may indicate that it should be categorized as highly conservative (Gordon et al, 1998). From the literature about German accounting, it seems that its conservatism is based on two main principles: creditor protection and preservation of capital in addition to the tax influence. These two principles will be explained as the underlying causes of this main feature of German accounting. This will be followed by the main aspects of the conservative side of German accounting.

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[68] For example the influence of tax is discussed in the taxation as a source of accounting regulations.
[69] This is the main reference chosen to guide the explanations of this section.

3.7.1.1 Creditor protection:

Baetge et al (1995) emphasise that the most important characteristic of German accounting is the significance of the principle of creditor protection.

The concern with this principle can be traced back to the Common Prussian Law of 1794 and the first German Commercial Code in 1861. The main concentration in these laws was given to asset and liability valuation, which gave the balance sheet priority over the profit and loss account (Baetge et al, ibid). Gordon et al (ibid, 299), on the other hand, state that

> "Historical experience of corporate collapse and the importance of long-term credit as source of finance has ensured that protection of creditors is a primary feature of commercial law as it affects accounting".

Moreover, Baetge et al (ibid) explain that the principle of creditor protection is partially related to the fact that bank loans are an important element in financing German firms. They also refer to the fact that "German banks are required by law to verify credit worthiness based on year-end financial statements when issuing large loans". Consequently, analysis of these statements pays specific attention to the ability of firms to service debt (Gordon et al, ibid). The relative importance of bank-lending for German firms is discussed above and also in Chapter 2, as well as in Chapter 5.

3.7.1.2 Preservation of capital (maintenance of capital):

One main factor underlies the prudence of German accounting is the tendency in German firms to safeguard their sources of internal finance. Baetge et al (ibid) see that preservation of capital is primarily for the safeguarding of a firm and that, on a long term basis, is reflected in the presentation of the financial statements. Goldberg and Godwin (2002) suggest that the orientation towards preservation of capital alongside creditor protection is the main reason for the conservative bias in German accounting.

According to Ordelheide and Pfaff (ibid, p.150), the maintenance of equity capital is related to the high leverage of German firms (see above[70]). They also indicate legal rules (related to assets and liabilities) are the principal means of ensuring that firms "do not allow their capital base to shrink". Preservation of capital can be simply

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[70] It is referenced in many positions earlier that there is an argument about this.

explained as a principle which requires prudent distribution of profits in order to recycle a considerable part of these profits back into the firm (internal finance). Radebaugh, Gebhardt and Gray (1995, p.173) state that hidden reserves are in the interest of stakeholders other than creditors such as employees, local and tax authorities, who "prefer to trap cash in the business, thereby securing its future existence". One important thing is that the concept of capital maintenance is strongly interlinked with the concept of creditor protection, in a way it seems to be difficult to separate them from each other (Baetge et al, ibid).

3.7.1.3 Aspects of conservatism in German accounting:

Different practices in German accounting provide evidence of how conservative this system is. Gordon et al (ibid) give examples, which are: the prudent calculation of distributable profit: the valuation of fixed assets in accordance with the historical cost convention: that internally generated intangible assets may not be recognised: requirements in law for provisions for uncertain liabilities: provisions for losses on incomplete transactions (anticipating future losses). There is also a reference to hidden reserves which can be created as a result of discretionary reserves and undervaluation of assets.

Different authors, on the other hand, indicate that the conservatism of German accounting is evident in the calculation of distributable profits. Ordelheide and KPMG (2001) argue that the strong influence of prudence in German accounting concentrates on the interests of the creditors by minimizing profits rather than providing valuable information. Leuz and Wüstemann (2004) explain that creditor protection in Germany has been reflected in the choice of measurement rules favoured by creditors and limiting payouts to shareholders.

Elston, Thornburg and Weidinger (2003, p.4, 5) provide a list with the practices under German accounting which they describe as "mundane resources which lead to more conservative accounting under HGB". The following is part of that list (compare with information in Table 3.4):

- Assets are valued at historical or production costs; market value or higher costs of replacement are not allowed
- Leases are normally classified according to tax rules, and thus seldom capitalized on the balance sheet.

- Goodwill arising from consolidation can be deducted immediately against equity. However, this is not true any more after December 2000 (see Table 4.3 in Chapter 4)
- Extensive use of provisions.
- Provisions for future debt may be set aside from pre-tax profits
- Deferred tax assets arising from loss carry-forwards must not be recognized, and most other deferred tax assets need not be.

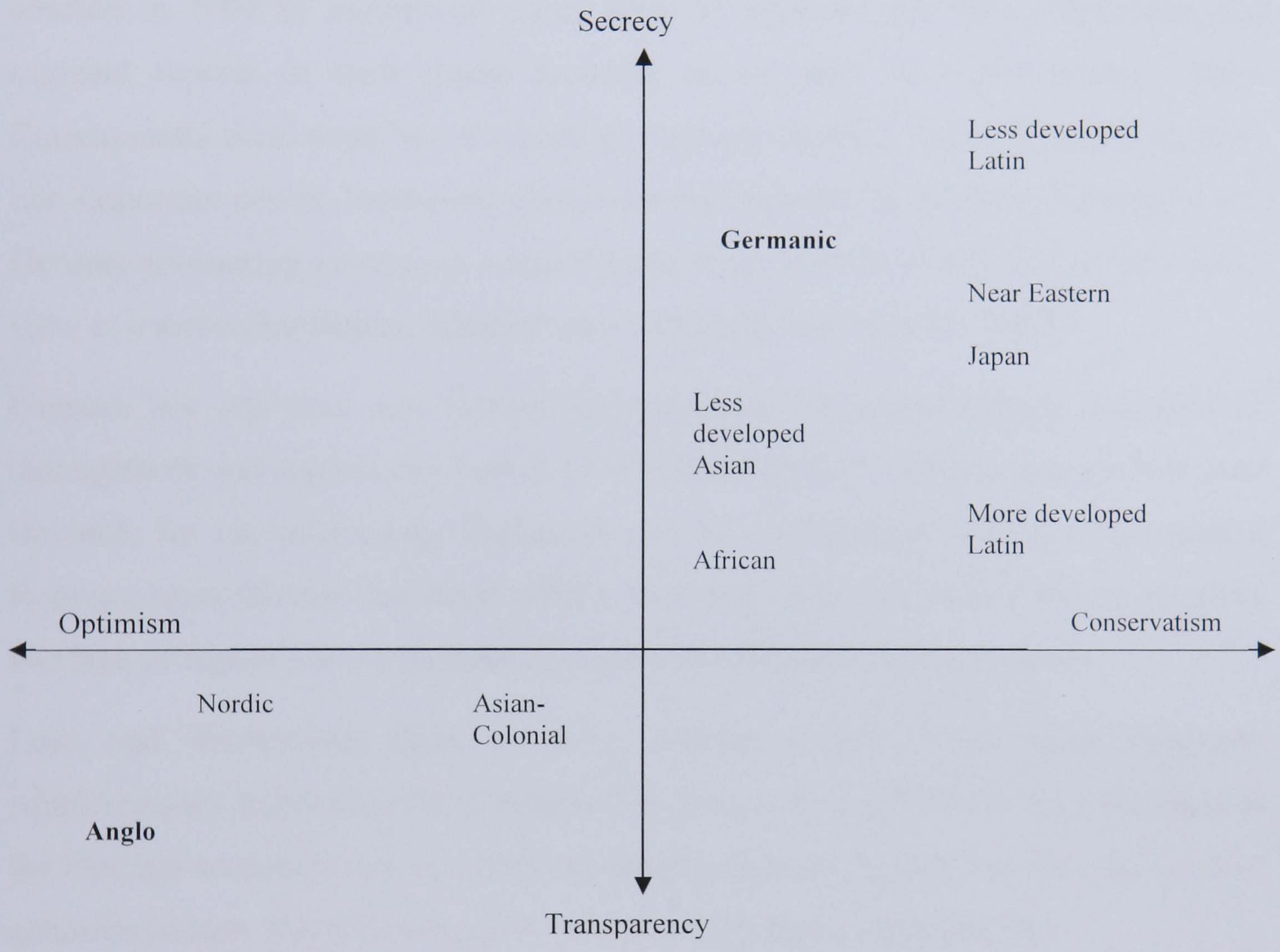

Figure 3.3: Gray's cultural dimensions (measurement and disclosure)

Source: Gray (1988)

3.7.2 Secrecy versus transparency:

Table 3.1 and Figure 3.3 show that German accounting is categorized by Gray (1988) as highly secretive. However, Gordon et al object to this classification and argue that information produced by German firms is reasonably extensive and that such categorization might have been caused by the reputation for using hidden reserves[71].

[71] Still, they do not provide any explanation or justification of this viewpoint

One important thing to note is that these arguments took place prior to the significant reforms in German regulation.

In recent years accounting disclosure has become a major issue in accounting literature worldwide. It is clear that accounting disclosure in Germany, in turn, has been a concern of German legislators since 1998. Prior to 1998, some crucial disclosure practices (e.g. cash flow statements and segment reporting) did not exist in the legal requirements of German reporting. Yet many larger companies provided them voluntarily (Leuz, 2004, Gordon et al, ibid). New disclosure legislation was enacted in 1998 to require all listed firms to present cash flow statements and segment reports in their group accounts on or after 31, 1999 (Leuz, 2004). Consequently there were two accounting standards (GAS 2, GAS 3) regarding these two important issues. Increasing disclosure requirements in German legislation and German accounting practice is a direct result of the shift from a strict creditor-based view to a more shareholder-oriented view (Rieckers and Spindler, 2004).

German law still does not contain any provision for action against members of management and supervisory boards to hold them directly liable to shareholders and investors for any misleading disclosures and the exclusion of pertinent information from accounts (Baums and Scott, 2003). However, some recommendations to cover this lack of legislation are included in a plan for a legislative action (ibid).

Leuz and Wüstemann (ibid, p. 463), provide a list of the most important supplementary information requirements for listed firms and which are expressed in the German securities law as additional requirements to those basic ones set forth in commercial law. The following is a summary with these requirements:

1. Disclosure of cash flow statement, segment reporting and a statement of changes in equity (see above).
2. Publication of a prospectus of which annual individual and group accounts are an essential part.
3. Publication of at least one complete set of interim financial statements.
4. Immediate disclosure of any important new facts which could considerably influence its share prices

5. The Frankfurt Stock Exchange Regulation (*Börsenordnung*) requires companies seeking listing in the Prime Standard segment: to provide quarterly reports, to comply with international standards and to provide "ad hoc" disclosure in the English language.

Still the argument of whether level of disclosure practiced by German companies is good enough to compete with that implemented by IRAS is left for the following chapter.

In fact German law has minimum disclosure (fundamental) requirement for business organisations of all legal forms (Ordelheide and KPMG, 2001). Yet, for higher quality and levels of disclosure the legal form and the size of business can be a determining factor. For example, most corporations are required to add notes to the accounts and a management report, while small ones are exempted from preparing a management report. Another example is that valuation rules in corporations are more investor-oriented than those for non-corporations (Leuz and Wüstemann, ibid).

It can be noticed from the explanation above the capital market has been a significant mechanism in structuring a high level of accounting disclosure. An important example is the level of disclosure practices required by the private law of the Deutsche Börse which organised segments such as the Neuer Markt, SMAX previously and organises the Prime Standard currently (see Chapter 2). This may have an important implication for the level of disclosure in companies which do not belong to the stock market, such as unlisted AGs and KGaAs and GmbHs (see Chapter 2 for all legal forms of German businesses).

3.7.3 Uniformity versus Flexibility:

Table 3.1 and Figure 3.4 show that, German accounting practice was classified by Gray (1988) as marginally uniform (mixture of uniformity and flexibility) (Roberts et al, ibid). Still, Choi and Mueller (1992); and Nobes and Parker (1995) (as cited in Nobes 2000) classified Germany as Macro-uniform. Feige (1997 a), on the other hand, criticises these two later models, and the classification of German accounting as uniform. He argues that German accounting is not as uniform as it is perceived through these models. To prove this, Feige used the treatment of currency translation as an example to say that, at least in this area, British accounting is more uniform than German. Mueller and Nobes (1997), in turn, indicate that Feige's study is full of

flaws, in particular, the empirical part[72] and that the issue of currency translation is an outlier[73]. Feige (1997 b. p. 768), in turn, states that the issue of currency translation is not an outlier. as there many major issues on which the HGB does not have any rules "(e.g. cash flow statements[74], leases, financial instruments. governments subsidies)". He argues that some degree of uniformity is caused by the provisions of tax law, such as depreciation rates, rather than the detailed rules of the HGB. As one can see there is no agreement on the uniformity of German accounting especially that Mueller and Nobes (ibid) concentrate on criticising Feige's empirical work rather than arguing for uniformity[75]; nevertheless, the researcher agrees with their criticisms.

Gordon et al (ibid) report that there are some aspects which may reinforce the notion of the uniformity of German accounting. Nevertheless they argue that despite these aspects, there is some degree of flexibility. For example, they indicate that although the chart of accounts has a long history in Germany, it is not mandatory. It may be important to indicate that these charts are the main argument on which Nobes based his classification (Nobes 1994). Gordon et al (ibid, p. 298) also argue that because of the stakeholders system, uniformity in the German published accounts is the means of ensuring comparable treatment of stakeholders (investors, management, creditors and employees; see Chapter 2). However, they suggest that flexibility of access to additional relevant information moderates this uniformity. Furthermore, they identify an unusual feature of German practice as "the variability allowed in valuing the net assets of the subsidiary on acquisition". Finally, one can also argue that the whole concept of GoB discussed above is reasonably flexible.

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[72] The weak points in Feige's study are: a very small sample, all the sample is in one industry, including only two countries, the sample year is 1994 which is after the integration of the 4th Directive and far from the time of the classifications of Muller, Choi and Nobes.

[73] That is because it is concerned only with group accounts and that it is also on those "rare major issues on which the HGB has no rules (Mueller and Nobes, ibid, p. 126)

[74] This seems odd, as one cannot expect to find requirements about the cash flow statement as long as German firms are not obliged by law to prepare. (Cash flow statement was first required in 1998)

[75] One should know that their reply to Feige was concentrated on defending their methodology and their models in general rather than arguing for "uniformity", on which was the main criticism made by Feige (1997 a).

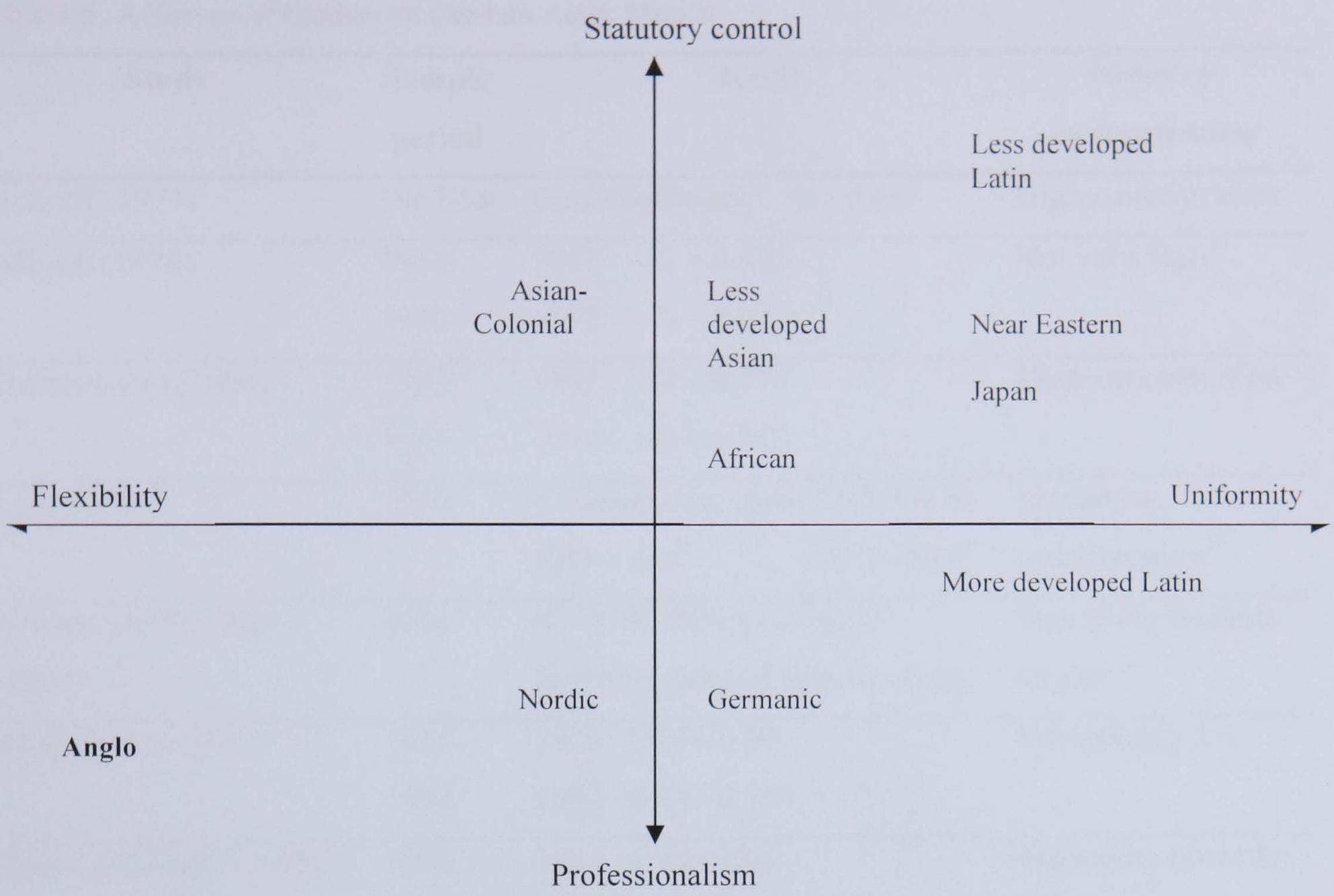

Figure 3.4: Gray's cultural dimensions (Authority and Enforcement)

Source: Gray (1988)

3.8 The German Audit Market:

For the purpose of this study, the German audit market can be narrowly defined as the group of professional entities which are in charge of auditing the financial statements of German firms. The identity of the auditor employed by German firms is of concern in this research as a possible influence on the choice of GAAP, so an overview of the composition of the German audit market is required.

A number of studies in the German financial literature focus on the structure and developments in the German audit market. Quick and Wolz (1999) provide a survey of these studies which are summarized in Table 2.4 below. It can be seen that, in general, there is high concentration in the German audit market. Yet, the results shown below should be compared cautiously because of some important methodological differences[76].

[76] Apart from differences in size of samples (stated below), they use different surrogates for the size of the audit market.

Table 3.5: A Survey of Studies on German Audit Market

Study	Sample period	Result	Notes on concentration
Schruff (1973)	1967/68	Gini-coefficient: G= 0.86[77]	High concentration
Albach (1976)	1951-1972	1951 G = 0.625 1972 G = 0.67	Not very high[78]
Helmenstein (1996)	1987-1991	1987 G = 0.775 1991 G = 0.810	High concentration
Lenz (1996)	1990	Concentration ratio: CR3 = 0.76 CR4 = 0.82 CR7 = 0.887	Increasing concentration[79]
Marten and Schultze (1997)	1994	G = 0.89 (based on sales) G = 0.89 (total of balance sheet)	Increasing towards largest 7
Buijink et al (1996)	1970 1994	1970 CR4= 0.09 1994 CR4= 0.16	Remarkably low[80]
Quick and Wolz (1999)	1994	1991 CR4= 78.5 1994 CR4= 79.2	Increasing towards largest 7

Source: based on information in Quick and Wolz (1999)

One important limitation which should be considered when comparing the results shown above is that the studies use samples which are significantly different in size and type of firm. For example Lenz (1996) studied 2265 stock corporations[81] (AGs), whereas Marten and Schultze (1997) used a sample of 250 listed firms.

Quick and Wolz (ibid) note that there is a general trend of concentration to the benefit of the largest seven audit firms. The largest seven in Germany during the period covered were: KPMG, C&L Deutsche Revision, WEDIT (Deloitte & Touche), Schitag (Ernst & Young), BDO, Price Waterhouse and Andersen. Furthermore, concentration is also high in favour of the two leading firms, KPMG and C&L Deutsche Revision.

The map of the German audit market in recent years has witnessed significant changes and more concentration. One can think of two possible reasons for this: on

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[77] A commonly used concentration measure

[78] This study is criticised for using a poorly selected sample.

[79] Although the measures of these two studies shown in this table are different, Professor Hanzrudi Lenz in unpublished paper in (1998) reports that they are higher than those reported by Schruff (1973)

[80] This remarkably low concentration could be explained by choosing "inappropriate" surrogate for measuring the size of audit market (Quick and Wolz, ibid).

[81] Mistakenly Quick and Wolz (ibid) report that they are listed stock corporation. This cannot be true as the number of listed AG has never been larger than 1000 (see Lenz (1998)

the one hand, mergers between audit firms have taken place, so that the number of large firms is less. On the other hand, there is an increasing tendency of German firms to import international capital (Theissen 2004), which in turn may increase their tendency to use large multinational audit firms.

German companies in *Hoppenstedt* (2003), in which the sample firms of this research are listed, are audited by approximately 237 audit firms[82]. Table 2.5 provides important information on the distribution of these firms:

Table 3.6: Distribution of Auditors over Listed Firms (2001)

Auditor	**Number of audited firms**	**Percentage**
KPMG	156	15.5 %
PricewaterhouseCoopers	151	15.0 %
Ernst & Young	102	10.1 %
Arthur Andersen	93	9.2 %
Deloitte and Touche	16	1.6 %
BDO	58	5.7 %
Other	434	43.0 %
	1010[83]	100.0 %

It can be seen that the international Big 5 audit 51.3 % of listed firms. However, the proportion belonging to Deloitte and Touche is very small. Furthermore, BDO had the next largest proportion.

In fact, it is not in the scope of this research to measure the concentration ratios to be compared with the ones shown above[84]. However, different indications suggest high concentration in this market. First is the high percentage of the number of firms audited by these big firms, especially the largest two. Second, is the fact that the vast majority of DAX firms and other large firms are audited by the Big5 (see Chapter 6). As total assets and sales of audited firms are the commonly used surrogates measuring concentration, one would expect high concentration especially given the fact that DAX firms are exceptionally large[85].

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[82] These are the firms listed in Hoppenstedt which includes firms listed on German stock markets other than Frankfurt. However, this number is approximate because for about 30 firms, the name of the auditor was not available.
[83] This number includes firms listed on other stock markets (other than FWB).
[84] The relative importance of piece of information for this research is much less than the time cost needed especially that one can confidently conclude that concentration is high as explained above.
[85] This can be seen clearly in Chapter 7 where such firms are considered as outliers and even with extreme values compared with the rest of the sample.

The high concentration of the German audit market is not unusual compared to the UK audit market, in which the largest four held 90% of the market for listed firms (based on audit fees) in 2002 and 96 % after the demise of Andersens (Beattie, Goodacre and Fearnley, 2004). The German audit market for listed companies seems noticeably less concentrated than in the UK with a significant share of the market outside the big 4 or 5. Yet, in general, the international audit market does not significantly differ from the German with respect to the names of the largest audit firms (for an overview the international market see (Chapter 5).

3.9 Implications of this chapter for the current research:

Overall, this chapter provides a detailed insight into the characteristics of German accounting compared with Anglo-Saxon accounting to which IAS and US GAAP belong. Traditional German accounting is strongly influenced by the concept of creditor protection rather than being investor oriented. In general, this is reflected in the fact that German accounting is more conservative and less transparent than Anglo-Saxon accounting. This also implies that German companies are sacrificing their secrecy, and from a German point of view, may be risking their firms' future by being less conservative[86] when they switch to IRAS.

The fact that the German audit market is not as concentrated as the UK market may gave implications for the relationship between auditor choice and the choice of GAAP. In Germany audit firms outside the Big-5 audit nearly 50% of listed companies and therefore the act of choosing a Big-5 auditor may be a more powerful signal than in the UK, where the Big-4/5 dominate the audit of listed firms (see Section 3.8 above).

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[86] Recall that one of the main foundations of the conservatism in German accounting is the concept of capital maintenance, which is concern with the future growth of the firm (see Section 3.7.1).

4 Chapter 4: German GAAP, IAS and US GAAP

4.1 Introduction:

The purpose of this chapter is to provide an explanation of the relationship between German GAAP (hereafter GGAAP), IAS (IFRS) and US GAAP (IFRS and US GAAP collectively IRAS)[87]. It is structured into six main sections: First, it describes the general attitude of German interested parties towards IAS (IFRS) and US GAAP prior to incorporating them into German Law. Second, the case of Daimler Benz is used to illustrate different important points. Third is a discussion about income smoothing. Fourth, the main differences between the three models of accounting (or maybe two[88]) are explored. Fifth, follows a discussion of the value relevance of GGAAP compared with IAS and US GAAP. The final section is a brief overview on the prospective use of IAS in EU member states.

4.2 The use of IRAS prior to 1998:

It is argued in Chapter 2 that there has been a lack of a strong equity culture in Germany. Furthermore, it was explained that German accounting has traditionally focused on creditor protection and is strongly connected with tax accounting. According to Glaum (2000, p. 24)

> "With increasing transparency and competition in international capital markets, the growing importance of international portfolio diversification, with foreign institutional investors acquiring stakes in German corporations, with the firms themselves seeking to broaden their equity base internationally, German accounting has come under intense pressure"

As a result of these pressures, German firms were forced to orient their financial accounting towards the information needs of investors rather than the traditional orientation towards creditor protection.

IRAS had been used by a few large German companies prior to its recognition by German legislation in 1998. German firms needed to adopt international accounting practices for different reasons. Glaum (2000, p.23) reports two main reasons for this: while some German firms such as Daimler-Benz, Deutsche Telecom and VEBA

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[87] As defined in before it stands for Internationally Recognised Accounting Standards, which would include both IAS and USGAAP.
[88] If we considered that IAS and US GAAP belong to one model (Anglo-Saxon)

were "effectively forced" to adopt US GAAP to satisfy the SEC requirements for listing on the NYSE. other German firms such as Bayer, Adidas, and Schering adopted IAS to enhance their image and attract international investors.

The adoption of IRAS by German companies prior to 1998 was through three different routes. First, firms which were listed on US Markets such as Daimler Benz had to reconcile their accounts to US GAAP through form 20 F (see below). Second, other companies incorporated options from IAS or US GAAP into their reporting supposedly within the framework of the HGB. Third some firms such as Adidas provided supplementary statements according to IAS. Table 4.1 below provide some information on a small sample of larger German firms which used IRAS during the mid nineties (Pallett, 1997).

One important issue is that companies claiming compliance with IAS may not in practice be compliant or not fully compliant. In other words, some firms may claim that they follow specific accounting standards, while their observance of these standards is incomplete. Street, Gray, and Bryant (1999, p. 46) examine 49 annual reports for 1996 from different countries claiming compliance with IAS[89]. This sample includes the annual reports of three German firms: Bayer, Heidelberger Zement and Schering. The authors find that there are significant cases of non-compliance on the level of both measurement and disclosure requirements of IASs. They also conclude that "While many companies may appear anxious to seek the international investment status that comes with the adoption of IASs they are not always willing to fulfil all of the requirements and obligations involved".

Furthermore, Taylor and Jones (1999) examine how and where companies refer to the use of IAS and the implications of this behaviour in a sample of companies (including German companies), claiming compliance with IAS in the annual reports for 1996. They classify companies into categories and classes, according to their policy in using IAS[90]. The authors conclude that a significant number report the use of IAS with exceptions (such as is the case in German firms). They also indicate that the majority of these cases do not discuss the monetary impact of the exceptions

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[89] The compliance was either stated in the notes to accounting and or audit opinion.

[90] For example, they have a category for companies that refer to use of IAS in the footnotes and audit report, and another category which refer to IAS in the footnotes only. Furthermore, they classify companies according to the extent of using IAS (for instance, whether they use IAS along with home country standards or not).

which, in turn, implies that they "choose those standards they like and disregard those that they do not like" (p. 568)

Table 4.1: The use of IRAS by German companies prior to 1998

Company	GAAP	Format used	Date	Reason	US listing	Listing abroad[91]
Adidas	IAS	Supplementary statements.	1994	None given	No	Paris
Bayer	IAS	Implemented within G GAAP by exercising options	1994	Greater transparency and international compatibility	No	15 non-German exchanges
Daimler-Benz	US GAAP	Implementation of US GAAP in main financial statements where allowed + reconciliation (full compliance in later years)	1993	US listing and access to international finance	Yes	Switzerland, Tokyo, London, Paris, Vienna, and New York
Deutsch-Bank	IAS	Supplementary IAS accounts in addition to German statutory requirement	1993	Transparency and information quality	No	Amsterdam, Basel, Geneva, Antwerp, Brussels, London, Luxembourg and Paris
Deutsch Telecom	US GAAP	Group accounts use US GAAP to the extent permissible under HGB.	1995	In preparation for privatisation and US listing	Yes	New York, Tokyo, SEAQI
Heidelberger Zement	IAS	Implemented where do not conflict with HGB	1994	International comparability	No	N/A
Hoechst	IAS	Implemented where do not conflict with HGB	1995		No	Amsterdam, Geneva, London, Paris, Tokyo
Merck	IAS	Implemented where do not conflict with HGB	1995	To support stock exchange floatation given its size	No	N/A
Schering	IAS	Implemented where do not conflict with HGB	1994		No	London
SGL Carbon	US GAAP	US GAAP reconciliation	1996	International comparison and US listing	YES	New York
VEBA	US GAAP	Within GGAAP in addition to supplementary notes	1995	International attractiveness and preparing for US listing	Autumn 1997	Amsterdam, Vienna, Geneva, Zurich

Source: Pallet (1997)

[91] These are only some and not all the international stock exchanges on which these firms are listed.

4.3 Debate on the need for using Anglo-Saxon accounting in Germany:

In 1991, the SEC rejected an application made by some German firms asking for an exemption from the reconciliation requirements which apply to foreign registrants, arguing for the capability of German accounting and its disclosures. As a result of this rejection, the debate on whether German accounting should adapt to the Anglo-American model became public (Harris, Lang and Möller, 1994). Many German commentators have argued against the idea that German accounting is inferior to the Anglo-American accounting in satisfying the needs of global financial markets for investor-oriented reporting (Glaum ibid).

The main concern about the move of German accounting towards Anglo-American accounting is, in fact, caused by the significant difference in dealing with profits under the two models. As explained in Chapter 3, the conservatism of German accounting caused by creditor protection and capital preservation concepts is evident. There is no doubt that German accounting is not investor-oriented as Anglo-American accounting is. However, it could be argued that the long-term perspective in dealing with profits in German accounting works for the survival of the firm, in contrast with the short-term perspective in Anglo-American accounting (Pallett, ibid). In fact, the vast majority of arguments about the quality of German accounting compared to the Anglo-American model are mainly based on measuring and managing earnings. Booth, Broussard and Loistl (1997, p.590) indicate that "theoretically, neither country's GAAP can be considered superior to the other. The difference between them may simply reflect a different view of what constitutes earnings". Therefore, because of the importance and sensitivity of this subject, it is fully discussed in a later section below.

At the early stages of this debate about the use of international accounting in Germany, C&L Deutsche Revision AG ran a survey in 1994 addressed to the top financial managers of larger German companies and university professors[92] (Glaum and Mandler, 1997). The focus of the questions of this survey was on the attitude of the participants towards international accounting harmonisation and towards the potential adaptation of German accounting to Anglo-American rules. The researcher

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[92] This can be an indication on the importance of German academics in the German accounting practice and support information given on this in Chapter 2.

believes that it would beneficial to include these results as summarised by Glaum and Mandler (1997, p 464):

- Managers had a largely positive attitude towards 'the current German accounting' (at that time), and did not consider it to be inferior to US accounting with respect to value relevance. Professors, on the other hand, were more positive towards international accounting than the managers.
- While, managers were sceptical about particular US GAAP standards, professors had more conflicting views.
- The vast majority of the participants were in favour of the adoption of international accounting standards. However, nearly all of them thought that harmonisation should be limited to consolidated accounts.
- Whereas managers were in favour of a free choice between three sets of accounting standards (as it was after 1998), the professors thought that adoption of IAS should have been compulsory for consolidated accounts.

In their explanation of the professors' opinion, the authors argue that the expected reform in Commercial Code would devalue professors' know-how. However, this know-how would also increase in the transitional period because it is much easier for professors to acquire knowledge about new regulations than other interested groups. The increase in professors' expertise, in turn, will be reflected in increased publications and seminars. Still, Glaum and Mandler state that the interest element is not evident in the professors' view[93].

On the other hand, the arguments employed to explain the managers' view relate to income measurement and management (see below). Apart from the arguments about earnings management, and because of the complex relationship between managers' behaviour and firm characteristics, the authors test a group of hypotheses base on the impact of these characteristics on managers' attitudes towards IRAS (discussed in detail in Chapter 5). Additional hypotheses examined are not directly related to the firm. They state the hypothesis that the greater the discretion managers have, the greater their opposition to the adoption of IRAS is. Conversely, they also hypothesise that: managers' support for IRAS increases if they have extensive

[93] They do not test any hypothesis about it and confine their examination to managers' attitudes.

knowledge and experience of US accounting practice: the more they believe in the importance of accounting data in capital markets, the more they believe the HG B to be a barrier to attracting international investors (see results above).

Moreover, Glaum and Mandler (ibid) examined the differences between managers' opinions and those of the academics and found that they were statistically significant. However, another survey with a broader sample size was conducted at the beginning of 1998. Glaum (ibid) used this survey to compare the responses of only those who were questioned in 1994 with their earlier responses. Results of this comparison show that the attitude of German financial executives towards adoption had changed significantly. Managers seemed to have accepted the idea that German accounting was not capable of meeting the needs of global stock markets. Furthermore, they had become more welcoming to the move to IRAS. Moreover, it was evident from the whole sample that there had been a significant shift in managers' attitudes towards accepting IAS rather than US GAAP as the basis for the internationalization of German accounting.

One main related issue was about the need to reconcile to US GAAP for listing on US exchanges. The German point of view against reconciliation and in favour of mutual recognition was expressed by Herbert Biener, from the German Justice Ministry and the senior civil servant responsible for accounting (1994,p. 340) (although one should remember that this is inevitably an official point of view):

> "Reconciliation is misleading and confusing for all those involved if it has the consequence that enterprises disclose two different kinds of net income and net assets. What will happen when a German public company listed on the New York Stock Exchange published a profit there, but on the stock exchange in Frankfurt a materially lower profit or loss?"

He further questions the reaction of the German tax authorities when they realize that provisions under GoB which are tax deductible are shown as equity under US GAAP[94] (see income smoothing below). Moreover, it would be rather difficult to explain this to people who are not familiar with accounting rules. Biener (ibid, p.341) also argues that 578 foreign companies were listed on German exchanges in 1991

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[94] We should note that this argument disregard the fact that taxation in Germany is not related to consolidated accounts. This because the discussion is focused on the introduction of Anglo-American accounting disregarding whether they are for suggested for individual accounts or consolidated ones.

without the need for reconciliation. He argues that this did not cause any damage to investors and that lack of comparability is not a good reason for refusing mutual recognition.

In general, this showed that although the opposition to the introduction of Anglo-American accounting in Germany was quite strong in the early nineties, the opinions in the late nineties of several interest different parties had become more flexible.

4.4 The case of Daimler-Benz

Daimler-Benz AG (hereafter DB) is a commonly used example in the literature on German accounting. It has been an important example for different reasons which are also the same reasons for which it is discussed here: First, it is widely known that DB was the first German company to be listed on NYSE and consequently raised the issue of compliance with US GAAP. Second, the substantial differences between the information produced under each of the two GAAPs raised many criticisms and concerns about German accounting. Finally, DB can serve as a perfect example for practitioners and academics of how international differences in accounting can have substantial effects.

The former Daimler-Benz (Daimler Chrysler currently) was the largest industrial group in Germany in terms of sales in 1993. DB shares had been traded on the eight German stock exchanges. It was the holding company of four 'corporate units': Mercedes-Benz, AEG, Deutsch Aerospace and debis. Prior to its listing on NYSE, DB had had its shares listed on the exchanges in Basel, Tokyo, London, Switzerland, Paris and Vienna (Daimler Benz AG, 1993).

Radebaugh, Gebhardt and Gray (1995, p.167), suggest that although DB was planning to invest in a plant in Tuscaloosa, Alabama (USA), it had other reasons to seek a listing on NYSE, because this direct investment in Tuscaloosa was small compared to the total investment by the DB group. The following is a summary of these reasons:

- Direct access to the largest stock market in the world, through which DB could market its planned large equity offerings, which could not have been easily absorbed by the relatively small German stock market.

- NYSE was expected to increase demand for DB shares and to increase the number of shareholders. This is especially because: some US institutional investors were not permitted to invest in securities not registered with the SEC; transaction costs in Germany were higher than in the US: US investors may have perceived information deficiencies when purchasing shares listed on non-US markets.
- There was a fear that the major shareholders (Deutsche Bank AG and the Emirate of Kuwait) were intending to reduce their investments in Daimler-Benz.

It is widely believed that a major obstacle to the listing of German firms on US stock exchanges has been the requirement to comply with USGAAP (see Harris et al, 1994; Cairns, 1994)[95]. In the early 1990s, for example, Deutsche Bank considered listing its shares on the NYSE, but was deterred by the disclosure requirements (Matthews and Kraus, 1993).

The move taken by DB by listing on NYSE was not welcomed by larger German firms, such as Bayer and Siemens, which had been holding out for mutual recognition. In fact mutual recognition had been strongly advocated by different interested parties in Germany (Ball, ibid).An example of the strong defence of mutual recognition is apparent in the different statements by Biener (ibid):

> "There is no doubt that improved comparability is helpful, especially for investors, but, in a market economy, this issue can be solved by competition. If investors prefer enterprises to give comparable information, competitors will consider whether in this case additional information should be used to influence the market price of their securities. This way is preferred in Germany". (p.340)

However, one year before the statement quoted above, in March 1993, Dr Gerhard Liener, the chief financial officer of DB (as cited in Van Hulle, 1993, p 388) stated: as the English language has become the world language, the Anglo-Saxon accounting rules are getting stronger bases and are becoming the world's accounting

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[95] This may not be the case for companies from countries other than Germany. Different non-US firms had been listed on NYSE before DB.

language. It is clear that the term 'Anglo-Saxon' used by Liener does not include UK accounting, simply because it was not an option for DB.

By reconciling its financial statements to US GAAP, DB stated its first-ever reported loss (Ball, 2004). In 1993, DB had net income of DM 602 million under GGAAP. This net income was converted into a large loss of DM 1,839 million under US GAAP. Before explaining the major reasons behind this substantial change, it would be more appropriate to show how the main items appeared in the reconciliation. Table 4.2 presents these items and their proportional effect on both the reported earnings and the equity of DB under GGAAP:

Table 4.2: Reconciliation of Earnings and Equity of DB in 1993 from GGAAP to US GAAP

	Changes in earnings		**Changes in equity**	
	DM (Mio)	%	DM (Mio)	%
1. Adjusted net income/equity under GGAAP	602		17,584	
2. Changes in appropriated retained earnings	(4,262)	-708.0 %	5,770	32.8 %
3. Long-term contracts	78	13.0 %	207	1.2 %
4. Goodwill and Business acquisitions	(287)	-47.7 %	2,284	13.0 %
6. Pensions and other postretirement benefits	(624)	-103.7 %	(1,821)	-10.4 %
7. Foreign currency translation	(40)	-6.6 %	85	0.5 %
8. Financial instruments	(225)	-37.4 %	381	2.2 %
9. Other	292	48.5 %	(698)	-4.0 %
10. Deferred Taxes	2,627	436.4 %	2,489	14.2 %
11. Net income/equity according to USGAAP	(1,839)		26,281	
DE= line11 – line1				

Source: based on information from Radebaugh et al (ibid)[96]

The following is a summary with the explanations presented by Radebaugh et al (ibid) for the most significant adjustments in the reconciliation to USGAAP. First, the item 'changes in the appropriate earnings' is caused by differences in the recognition and valuation of provisions, which had been created by DB to prevent these amounts from being distributed to shareholders. Second, the item "goodwill and business acquisitions" is the result of the fact that the net assets of businesses acquired by DB prior to 1988 were valued at historical cost rather than fair value[97]. Furthermore, further adjustments were required because of the amortization of goodwill. Goodwill was usually amortised over a period of 5-15 years (tax-driven), whereas it could be amortised under US GAAP over a period of up to 40 years.

[96] Radebaugh et al present this list for 3 years: 1991, 1992 and 1993. However, only one year is illustrated here.
[97] This was changed in 1988 but only for net assets acquired after 1987

Third, as a result of actuarial assumptions and requirements of SFAS 87 and SFAS 106, DB had to increase provisions for pension costs and similar obligations. Fourth, the deferred tax adjustment can be explained by two main factors: the difference in the method of calculating deferred taxes and the income tax effects of the adjustments made for the reconciliation. German companies use the liability method for deferred taxes, but recognise them only to the extent that deferred tax liabilities exceed consolidated deferred tax assets. Furthermore, deferred tax assets are recognised only on temporary differences resulting from adjustments related to consolidation and not valuation. Under US GAAP, on the other hand, deferred taxes are computed for all temporary differences using the liability method and are based on statutory tax rates. As shown in Table 4.2 above, the major source of difference which led to showing this big loss shown under USGAAP is the DM 4.262M reduction under the heading of changes in appropriated earnings. According to Ball (ibid), this item is the sum of two amounts: 'Extraordinary Results' and 'Gain on Sale of Securities', which are reported in the company's 1993 Consolidated Statement of Cash Flows. Furthermore, he explains that these amounts are hidden reserves which were released to cover the losses of this particularly bad year.

In general, the differences shown in the reconciliation of DB support the conservatism and smoothing hypotheses generally linked with G GAAP in the literature.

Although Daimler Benz must have known the highly negative result of the reconciliation, they were encouraged to take this step. Gray et al (1995, p.168) try to explain this by stating that "the decision of Daimler-Benz's management to publish accounting data based on U.S. GAAP can be thought of as an unusual signal of its confidence in the future financial results of the company".

While the conservatism of German accounting is discussed in Chapter3, income smoothing is discussed in the following section.

4.5 Earnings management and income smoothing:

Earnings management and income smoothing is an essential characteristic of German accounting. One may think that it could be better to discuss it in Chapter 3, which focuses on the main features of German accounting. However, the researcher has chosen to discuss it in this chapter, mainly because it is believed to be a major

factor underlying significant difference between German accounting and Anglo-Saxon accounting.

Furthermore, Ball, Kothari and Robin (2000) conclude that "German accounting in particular is widely presumed to be more conservative, because German managers have unusual discretion to reduce reported income during good years. However, they also have unusual discretion to delay recognition of economic losses, and thus to increase reported income in bad years". Leuz, Nanda and Wysocki (2003), on the other hand, proved that Germany is among those countries in which income smoothing is evident[98].

The following are some of the factors suggested by Ball (2004, p 121) as incentives to smooth income in code law countries:

- Stock-related compensation schemes are not widespread in a stakeholder system. "Managers are evaluated to a lesser degree on the basis of shareholder value" (one stakeholder alone). Risk aversion among managers creates the need to reduce earnings volatility.
- Employee bonuses and stockholder dividends based on reported earnings, creates motivations to reduce income volatility. Reporting a loss may eradicate bonuses and dividends (smoothing will secure profits for bad years).
- Additional taxes on retained earnings generate strong incentives to hide earnings in excess of those needed to pay considered necessary dividends and bonuses.
- To plan tax collections, governments do not like volatile earnings (they also do not want to see a fall in revenues in times of recession).

To smooth income, management need to use accounting policies which reduce income in good years, but can be also used to increase it in bad years (Pallett, 1995). Earnings can be managed by hiding reserves in good years and drawing on these reserves in later years to cover any losses and reduce volatility. Hidden reserves can be created by recognising provisions[99] (e.g. excessive provisions for future losses or future expenses); transfers to reserves (e.g. crediting a shareholders equity reserve

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[98] Countries were clustered in different clusters, where Germany was clustered with Japan as insider economies.

[99] In accounting terms, this means debiting earnings using credit entry such as provisions.

account); asset valuations by write-down (e.g. excessive allowances of bad debts). In bad years these accounting entries can be reversed to increase book income (Ball, Kothari and Robin, 2000). Daimler-Benz (1993) is a widely used example for this type of income smoothing.

An important question is what does the move to IRAS [100] mean for income smoothing? What are German managers going to have to give up?

Glaum and Mandler (ibid) indicate that German Commercial Code contains considerably more scope and options than US GAAP for smoothing income. They also state that German managers enjoy more freedom to accumulate and transfer hidden reserves and, consequently, smooth their companies' profits. Günther and Young (ibid) also explain that particular accounting practices that can be used to manage earnings in code law countries are not permitted in common-law accounting. The authors report four types of revenue reserves used in Germany as an example for these practices.

Still, the opportunity for earnings management under IAS is controversial. A recent study by Tendeloo and Vanstraelen (2004), examined whether German listed companies complying with IAS engage significantly less in earnings management than those using German GAAP. The authors conclude that IAS increases the magnitude of discretionary accruals and that it does not significantly constrain earnings management. Gontcharov and Zimmerman (2002) also examine earnings management in German listed companies, but across three groups of companies: GGAAP, IAS and US GAAP. The researchers conclude that earnings management is more restricted under US GAAP than under IAS or GGAAP. Furthermore, they conclude that the level of income smoothing in firms reporting under IAS and those reporting under GGAAP is nearly the same. On the other hand, some would think that the convergence of IAS towards US GAAP should reduce the opportunities for income smoothing (Burns 1998 as cited in Weißenberger et al, 2004). However, Weißenberger et al (ibid) state that there are greater opportunities for earnings management within IAS. They also state that the similarity between GGAAP and IAS is higher than between US GAAP and GGAAP. Dumontier and Raffournier

[100] Recall that this includes IAS and USGAAP

(1998), conversely, argue that adopting IAS making earnings management more difficult because it restricts the use of hidden reserves.

Overall, while it is fairly evident in the literature that US GAAP restricts income smoothing, it is not evident that IAS does so to the same extent.

4.6 Significant differences between GGAAP, IAS and US GAAP

This section aims to illustrate that despite the international efforts for convergence in accounting practices, there are still significant differences between the three sets of accounting standards used by listed German firms. Yet, it should be emphasised that Table 4.3 shows differences between the three sets related to the most significant issues in accounting regulations, but not all differences. Apart from the differences, this comparison shows that there is still a lack of regulation on some important accounting issues. Moreover, the researcher focuses the comparison on the period around the end of 2001, which is the sampling period for this research.

Table 4.3: Comparison between GGAAP, IAS and US GAAP around the year 2001

G GAAP	IAS (IFRS)	US GAAP	Comments
Valuation issues:			
Property, Plant and equipment: dismantling, removal and restoration costs cannot be capitalised.	Property, Plant and equipment: The cost of acquisition includes appropriate dismantling, removal and restoration costs.	Property, Plant and equipment: Similar to IAS	Valuation policies under US GAAP, in general, are as conservative as G GAAP. However, it shows GGAAP is tax driven.
Revaluations are not permitted.	Revaluation to fair value is allowed.	Revaluations are not permitted	
Depreciation is tax driven[101]	Depreciation is based on the useful life of an asset. Methods are reviewed periodically.	Depreciation: based on useful life of an asset. However, a periodic review is not required	
Intangible assets[102]: internally generated assets, including development costs, cannot be capitalised.	Intangible asset: internally generated assets, including development costs, should be capitalised if specific criteria are met.	Intangible asset: research and development expenses are expensed as incurred, but some software cost can be capitalised in certain stages of	
Revaluation is not permitted.	Revaluation is permitted in certain circumstances	Revaluation is not permitted	
Amortization is tax-driven.	Amortization period may exceed 20 years if justified		
Goodwill[103]: Should be capitalized and amortised over a useful life of maximum 20 years.	Goodwill: similar to GGAAP	Goodwill: Until Jan 2002, it should b capitalised and amortised over a useful life of a maximum 40 years.	
Amortised proportions should be taken through	similar to GGAAP	After Jan 2002, periodic testing of goodwill for	

[101] This can be interpreted as that useful life can be used but it is not the norm, because of the influence of tax accounting.
[102] Excluding goodwill, which is shown separately
[103] Goodwill as regulated with GAS4 (Published by the Federal Ministry of Justice in December 2000. Prior to that, it was allowed to be written off or amortised against reserves over four years.

G GAAP	IAS (IFRS)	US GAAP	Comments
income statement and not against reserves.		impairment is required instead of amortization.	
<u>Investment Property:</u> can not be valued at fair value	<u>Investment Property:</u> may be valued at fair value	<u>Investment property:</u> Must be stated at depreciated historical cost.	
<u>Inventories:</u> the lower of historical cost and market value. Purchase market prices generally are considered to be more relevant than sales market prices in assessing the current market (net realisable value) of inventory.	<u>Inventories:</u> the lower of historical cost and net realisable value. However, determination of net realisable value is based on the estimated selling price.	<u>Inventories:</u> Similar to IAS	
LIFO is acceptable; nevertheless FIFO and average cost are the common methods.	All three main methods are permitted (with LIFO rarely used)	Similar to IAS, but more common use of LIFO	
Provisions:			
In general they are influenced by prudence to a large extent. Provisions made for uncertain liabilities and for losses on incomplete transactions.	A provision is recognised on the basis of a legal or constructive obligation.	Similar to IAS	Prudence is strong in Germany, where provisions are widely used.
Often are measured at an amount higher than the most probable estimate.	A provision is recorded at its best estimate.	If a best estimate for a provision is not clear, the minimum of the range of potential losses is provided for.	USGAAP seem to be more flexible towards provisions than IAS.
Provisions are recognised for certain repairs and maintenance expenses.	Repairs and maintenance provisions are prohibited.	No prohibition on repairs and maintenance provisions.	

G GAAP	IAS (IFRS)	US GAAP	Comments
Equity:			
Governed by specific capital maintenance rules.	No capital maintenance rules.	There is no specific rules that are clearly linked to this concept.	
Some long-term financing is considered as equity even if repayment is expected.	Some shares may be classified as liabilities	Preferred shares may be classified between debt and equity. if their redemption is not controlled by the company. Otherwise, all shares are classified as equity	
Equity issue costs are recognised in income statement (I.S.) as incurred.	Equity issue costs are recognised directly in equity.		
Treasury stock held for reissue is classified as current asset with gains and losses from reissue recognised in I.S.	Treasury stock is deducted from equity and no gain or loss is recognised from trading in own shares.	Treasury stock is deducted from equity and changes in value, whether realised or not, are not recognised.	
Deferred tax:			
Recognised only to the extent that consolidated deferred tax liabilities exceed consolidated deferred tax assets (Partial provision based on liability method)	Recognised nearly for all timing differences calculated at tax rate expected at time of settlement (full provision using liability method).	Full provision for all timing differences under liability method. However, it has a special treatment for deferred tax assets in the balance sheet[104].	
In practice deferred tax assets, except those that arise from consolidation procedures, are seldom recognised.	Deferred tax assets are recognised when recovery is probable.	Recognised to the extent that recovery is highly probable.	
In practice deferred tax often is provided using an enterprise's average effective tax rate rather than the statutory rate.	Deferred tax is based on enacted or substantively enacted statutory tax rates.	It is based on enacted tax rates.	

[104] Deducting a valuation allowance when a recovery of less than 50 % is likely (PricewaterhouseCoopers, 2000)

G GAAP	IAS (IFRS)	US GAAP	Comments
Interest capitalisation: Borrowing cost may not be capitalised.	Borrowing costs may be expensed as incurred or capitalised if certain criteria are met.	Required to be capitalised when it relates to construction of certain assets	
Profits on long-term contracts: Reporting on completion (completed contract method) Yet, contingent losses on long-term contracts must be accrued.	Reporting on the percentage of completion method. Completed contract method is prohibited.	Reporting on the percentage of completion. However, the completed contract method is permitted.	
Leases: Classifications of leases are generally driven by tax guidelines (so some operating leases under G GAAP may be operational leases under IAS or US GAAP)	Classification of a lease is based on its substance.	Concepts of classification, in general, are similar to those in IFRS. However, with more extensive detailed rules which cause differences in application.	Less regulated under G GAAP and more prudent under USGAAP[105]
Foreign currency translation: Unrealised gains resulting from translation of foreign currency transactions are not allowed There are no legal requirements for translating the financial statements of foreign subsidiaries for consolidation purposes; nevertheless a variety of methods is	Unrealised gains resulting from the translation of foreign currency transactions are Allowed There is a variety of detailed rules for the translation of inter	Requirements for currency translation are comparable to those of IAS except for the case of hyper inflation[106].	Lack of regulation in G GAAP Until the publication of GAS-14 in 2004 June, there were clear lack of regulations.

[105] IFRS recognise any gain or lose result from a sale or a leaseback of an operating lease; where under USGAAP are recognised immediately

[106] According to IFRSs, statements of foreign entity adjusted to current price level before translation. According to USGAAP, they are remeasured using the reporting currency as a functional currency.

G GAAP	IAS (IFRS)	US GAAP	Comments
used.			
Segment reporting:			
Segmentation is based entirely on the internal reporting structure. Disclosures required are: internal and external revenues, results (depreciation and some other items included), assets, investments, capital expenditure and liabilities.	Segmentation is based on the principal source, risks and returns, as well as the internal reporting structure. Disclosures required are: revenues, results, capital expenditure, total assets and liabilities (other items). However, income tax, interest revenue, interest expense, extraordinary items and major customers are not required. Business and geographical, one of which may be as primary format; whereas the other can be secondary format (depends on their impact upon business risks and returns).	Segmentation is based entirely on the internal reporting structure. Disclosures required are: revenues, assets, results and major customers[107]. However, liabilities, depreciation, amortization, interest revenue, interest expense, income tax, capital expenditure extraordinary items and exceptional items are only required if they are parts in internal reporting[108].	While disclosures under IFRSs are more than GGAAP. disclosures under US GAAP are more extensive than both.
Discontinuing operations: There is no a concept for a discontinuing operation.	An operation is discontinuing when either there is a binding sale agreement or there is an announced plan for the discontinuance, whichever is earlier.	A component of an entity can be treated as a discontinued operation only when it is abandoned or spun off.	More regulations and more disclosures are required under US GAAP
Different disclosure			

[107] For external customers comprise > 10 % of consolidated revenues, total revenues and segment that reported the revenue should be disclosed

[108] Or in case they are regularly reported to a chief operating decision maker.

G GAAP	IAS (IFRS)	US GAAP	Comments
issue:			
Related Party disclosure: Only from April 2002: regulated by GAS 11.	Related Party Disclosure:	Related Party Disclosure:	
Related party relationships where control exists should be disclosed.	Related party relationships where control exists should be disclosed, although some enterprises are exempted.	There are no exemptions at all.	
Disclosures required include: a description of the transaction, volume, receivables, payables, pricing policies	Disclosures required include: purchases or sales of goods, purchases or sales of property and other assets, rendering or receiving of services, agency arrangements, leasing arrangements, transfer of researcher and development and management contracts, etc[109].	Disclosures required are more extensive than those of IAS	
Earnings per share (EPS): EPS is not required to be disclosed.	Earnings per share (EPS): Basic and diluted EPS must be disclosed on the face of the income statement.	Earnings per share (EPS): EPS data for continuing operations, discontinuing operations, extraordinary items and the cumulative effect of accounting changes are disclosed.	
Financial instruments: There are no specific rules comparable to those of IAS.	Financial instruments: A financial review by management is encouraged. Level of details depends on the risks of the instruments.	Financial instruments: It has more disclosure requirements than IAS for financial instruments.	

[109] The list of required disclosures is longer than this, this part is mentioned to show that it is more extensive than those of GGAAP.

G GAAP	IAS (IFRS)	US GAAP	Comments
Exceptional items: Presentation of exceptional items have more restrictive rules than under IAS	Exceptional items: May be disclosed separately in the income statement.	Exceptional items: The term exceptional is not used. Yet, similar items should be disclosed on the face of income statement.	

Source: based on information from KPMG (2004a), KPMG (2004b), PricewaterhouseCoopers (2002) and (2003), GASC (2004) and Haller (1998)

It should be mentioned here that despite the several works that provide detailed comparisons across different GAAPs in terms of different accounting policies, there is an apparent lack of literature on the overall impact of these differences on the reported earnings and reported assets and liabilities. However, a recent study by Elston, Thornburg and Weidinger (2003) reveal that sales, net income, assets, and equity are significantly lower and liabilities significantly higher when reported under HGB than when reported under IAS. Still, when compared to US GAAP, only net income and total assets were significantly lower when reported under HGB. Although their study provides a good comparison between the information reported under GGAAP and that reported under IRAS, it does not provide a similar comparison between IAS and US-GAAP. The reason for this is that each of the sample firms report under GGAAP and either of IAS or US GAAP (two sets of financial statements). Their results in general, support the notion of conservative German accounting discussed in Chapter 3.

4.7 Value relevance under G GAAP, IAS and US GAAP:

When lobbying for a particular set of accounting standards, one approach is to argue its value relevance. Many financial and accounting studies have concentrated on the issue whether the different accounting systems have a significantly different relationship with capital market. However, a very limited number of these studies have examined the relationship between returns in the German stock market and reported earnings by German firms.

Bartov, Goldberg and Kim (2002) explain that accounting regulators in different countries set their own rules for measurement, recognition and set limits on management's discretion in determining earnings. Furthermore, differences in enforcement levels, the objectives of financial reporting, and opportunistic use of accruals by management may lead to varying levels of value relevance of reported earnings.

The value relevance of accounting standards can be examined through studies of association which analyse the relationship between accounting data and stock returns (or prices)[110] over a long time period. This section is intended to discuss the results of the important association studies in which German accounting is examined. These studies are different from the event study, which examines the reaction of the share price to accounting or other disclosures over a short event window. The association between accounting measures and stock market data is usually analysed using regression equations. Dumontier and Raffournier (2002, p.128) define the purpose of these studies: "they only posit that if accounting data are good summary measures of the events incorporated in security prices, they are value-relevant because their use might provide a value of the firm that is close to its market value".

The value relevance of German accounting was compared with that of the US GAAP in a study by Harris, Lang and Möller (1994). They examine the association between the reported earnings (under GGAAP) and DVFA earnings[111]. One of their basic arguments is that the strong link between tax accounting and commercial accounting

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[110] Prices are considered to be an unreliable measure in this type of study (Dumontier and Raffournier, ibid p. 131).

[111] It is the result of adjusting reported earnings according to a list of adjustments produced by the German Federation of Financial Analysis and Investment Advice (DVFA). It is considered a second earnings measure reported by many German firms (Harris et al, ibid).

and the significant influence of the creditor protection concept reduces the value relevance of accounting data in Germany. An example given is that German accounting does not recognise items such as gains from foreign currency translation or profits on the percentage of completion of long-term contracts. Another example is the excess of depreciation allowed for tax purposes and provisions for losses of low probability. The authors also think that the use of hidden reserves in German companies can mislead investors. The following is a summary of the findings of Harris et al (ibid), which is of particular importance for this research[112]: First, as opposed to the view that accounting data are essentially irrelevant for German firms, data are significantly associated with stock price levels and returns. Additionally, the explanatory power of earnings (reported under GGAAP) for returns[113] is comparable to that in the US. Yet, the explanatory power of shareholders' equity for prices is significantly lower in Germany than in the US. Second is that the explanatory power of accounting data increases with consolidation[114]. Third, there is a little evidence that the explanatory power of reported earnings increased following the introduction of the EU Directives[115]. Fifth, there is evidence that the DVFA adjustments have a positive effect on the explanatory power of the reported earnings. This last result is also confirmed by Booth, Broussard and Loistl (1997), who find that earnings adjusted by DVFA are more value relevant than that provided under GGAAP. Given the fact that these DVFA adjustments are founded to undo the impact of some GGAAP rules and to increase the comparability with IRAS (Busse von Colbe et al, 2000), the value relevance of DVFA does not mean value relevance of German accounting.

Alford, Jones, Leftwich and Zmijeweski (1993, p. 213), on the other hand, conclude that accounting earnings from Germany (and few other countries) are less value relevant than the US GAAP earnings[116].

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[112] This is noted because, other studies involved Germany will not be dealt with in similar detail.
[113] Means having the returns as an dependent variable and that earnings as an independent variable.
[114] They find that unconsolidated data performs poorly compared with consolidated data.
[115] Harris et al (ibid, p. 207) find such a result surprising; nevertheless they try to explain this through a suggestion by German business managers indicating that "the changes (other the move to full consolidation) may have had little substantive effect and may in fact have introduced some ambiguity in the reported results"
[116]Their sample contained large number of countries; nevertheless each of them was compared with the US GAAP (county by country). Furthermore, accounting data in Australia, France, the Netherlands and the UK proved to be more timely and value relevant than that of the US.

Furthermore, Joos and Lang (1994) find that German accounting is more conservative than that of the UK and France. However, they also find that there is no evidence that German accounting produce data with a lower association with share price, compared with UK accounting.

Leuz and Verrecchia (2000) examine the hypothesis that increasing disclosure leads to statistically significant benefits. They also assume that IAS and US GAAP have higher levels of disclosure. The authors examined a sample of German firms using either IAS or US GAAP They find that reporting under IAS and US GAAP by German firms is associated with lower bid-ask spreads and higher share turnover, which are used as proxies for information asymmetry.

They examine the hypothesis that commitment to increased levels of disclosure by German firms reduces the information asymmetry component of the firm's cost of capital. They study a sample of German firms using IAS or US GAAP compared with a control sample using G GAAP[117]. Their results show that this international reporting strategy is associated with statistically significant lower bid-ask spreads and higher share turnover. They conclude that their results are consistent with the hypothesis that firms obtain economically significant benefits from meeting the increased levels of disclosures required by IAS and US GAAP.

Leuz (2003), on the other hand, examines the value relevance of earnings reported under US GAAP or IAS by testing the significance of differences in the bid-ask spread and trading volume using a sample of firms trading in Germany's Neuer Markt (reporting under either IAS or US GAAP). The hypothesis was that if US GAAP is superior to IAS, then firms reporting under US GAAP should have lower information asymmetry and higher market liquidity. He finds insignificant differences in bid-ask spread and share turnover between IAS and US GAAP firms. Furthermore, he concludes that his findings do not support the argument that US GAAP is of higher quality than IAS. These results are consistent with the opinion that IAS and US GAAP are equivalent in their ability to reduce information asymmetries in stock markets and that the differences are irrelevant to investors.

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[117] The control sample is constructed on the basis of industry and firm size. This means that each firm using international standards has a matching firm from the same industry and with comparable size using GGAAP firm.

Bartov, Goldberg and Kim (2002) argue that US GAAP and IAS are the products of common-law countries. This means that they have been developed in the private sector, are not influenced by taxation and come from countries where companies are by tradition financed through stock markets. Furthermore, the problem of information asymmetry between agents and principals is dealt with through financial reporting and timely public disclosure. Hence, they are expected to focus primarily on the needs of shareholders and investors for relevant information. GGAAP, on the contrary, is the product of a code-law country. This means that it has developed in a highly politicized environment, focusing on different stakeholders including the tax authorities. This focus results in the need for income smoothing rather than earnings informativness[118]. Thus, the authors expect that information produced under IAS or US GAAP has higher relevance than information produced under GGAAP. They also argue that US GAAP is more thoroughly defined than IAS, and hence they expect it to produce more value-relevant information than IAS. The authors find that results are consistent with their expectations, which indicate the higher earnings quality of U.S. GAAP, and IAS over German GAAP and that US GAAP is superior to IAS.

Finally, Elston, Thornburg and Weidinger (2003) find that accounting information under HGB, in particular total assets and net income, are significantly more conservative (lower) than under IAS or US GAAP. Furthermore, they find that asymmetrical information problems exist between German companies and their underwriters (banks)[119] under HGB reporting. The authors conclude that these problems lead to higher costs of certification[120] and IPO underpricing.

As one can see above, there is a general indication that the accounting information reported under GGAAP is less value relevant than information reported under IAS or US GAAP. Still, the results of Harris et al (ibid) cast some doubt on this conclusion. It should be made clear that the results (ibid) of the analysis is made on earnings

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[118]Stakeholders system is argued to be insider system, where information is used internally rather than being produced for outsiders.
[119] The authors do not provide any formal definition for an underwriter (they also call certifier), but the context of the study suggests that they mean the banks which help the company in issuing shares (IPOs) and certifications of these shares.
[120] In general, costs of \IPOs.

reported under GGAAP and not DVFA earnings[121], which have more value relevance.

4.8 Future of IAS in Europe

As mentioned earlier in this research, companies that are listed on EU stock exchanges should apply IAS to years beginning on or after 1 January 2005. In 2002, PricewaterhouseCoopers conducted an independent survey involving 650 chief financial officers (CFOs) across 15 European member states to investigate their opinions about the application of IAS (IFRS) in the year 2005 and its expected role in creating a pan-European capital market. The following is a brief summary of the significant results of this survey. The researcher believes that this summary enriches this chapter by casting light on the future of IAS in Europe, including Germany as a leading member in this union.

It may also be important to indicate that Germany had the largest number of participants in this survey (82 CFOs, 13% of the number of CFOs interviewed).

Table 4.4: Opinion of European Chief Financial Officers (CFOs) on the future of IAS

Issue	Response	Comments
Will IAS help establish a pan-European capital market?	80 % of respondents are convinced that conversion to IAS will be "very beneficial" to their companies and to Europe. (p.5)	
Has the adoption of IAS brought any benefits?	70 % of IAS users believe that IAS adoption benefited their company.	
	Only 41 % of the non-users think that using IAS will benefit them.	PwC indicates that it is difficult for non-users to appreciate the benefits of IAS before they conduct an "impact assessment".
Does the EC's IAS proposal go far enough? Should the use of IAS be permitted before 2005?	81% (90%) of respondents are in favour of earlier adoption	This high rate in Germany shows that the vast majority are willing to use IAS if able to do so.
	However, 45 % of respondents are using selected IAS data prior to 2005:	Most of those are the largest firms, of which two thirds opposed mandatory disclosure before 2005.

[121] Because one can argue that DVFA earnings can not be considered as representing German accounting. DVFA are originally established to have comparable results with those reported under foreign GAAPs.

Issue	Response	Comments
Use of IAS for US GAAP users:	55 % of respondents think that US GAAP should continue until US GAAP and IAS converge. Furthermore, 60% of respondents who currently use US GAAP would adopt IAS prior to 2007 if it was accepted by the SEC.	The deadline for US GAAP users to adopt IAS is 2007
Using IAS for individual accounts	71% (82% of the current users) of the respondent approved this idea.	
Using IAS for internal reporting	72 % of companies adopting IAS adopt it as the basis for internal management reporting	
Are European firms ready for IAS?	20% of respondents report that they are fully prepared. 92 % of non-users report that they are confident that they will be able to meet the deadline. 85 % of firms surveyed have yet to adopt IAS. The highest use of IAS is reported in Austria (40 %) and Germany (39%) However, the survey indicates that this readiness is conditional upon substantial training efforts.	Use of IAS in these two countries is permitted by law
Does IAS adoption affect the way shareholders and analysts view company performance?	The majority of respondents 'feel' that adoption of IAS does not have an important effect on evaluation of the companies' performance by shareholders and market analysts. A majority of non-users think that adoption of IAS will be an important improvement in the disclosure and transparency of their financial reporting	PwC consider this to be surprising and that it is a dangerous assumption.
Plan transition early	At the time of this survey 60 % of companies have not yet started transition planning. Three initiatives should be completed before external reporting can be considered: "scoping all aspects of the transition, development of internal IAS reporting processes and staff training across the organization" (p.3)	PwC saw that this was not surprising, because at that time, the EU's IAS regulation had not become law yet. Furthermore, the standard on the use of IAS for the first time had not been published yet.

Issue	Response	Comments
What do preparers want from IAS in the futures?	The EU's CFOs want greater convergence of international reporting requirements, with many pushing IAS and US GAAP to have similar solutions. CFOs want IAS to be "developed and continuously improved to ensure that they are principles-based, practical, simple, transparent and grounded in economic reality"	

The views presented in Table 4.4 show, in general, the positive rating of IAS by European CFOs. Furthermore, they provide a good indication of their perceptions of the implications of the adoption of IAS.

As indicated above German managers are important participants in this survey, and hence the opinions presented above should be useful for the explanations provided in the next chapter for the purpose of developing the current research's hypotheses.

4.9 Present developments and Future prospects of the use of IAS in Germany:

Following the survey of PricewaterhouseCoopers, there was a survey by Mazars in 2003) which also involved German firms. However, this survey provides some important points about the use of IAS in Germany rather than other EU countries. At the beginning of this chapter, there is a section which explains about the use of IRAS in Germany prior to 1998. This survey gives us the opportunity to have an overview of the present developments of the use of IAS and some future prospects. The following are only some of the main points concluded by this survey about German listed firms[122]:

1. Nearly 87% of German listed firms view the conversion to IAS as a real opportunity to improve the internal organization of their company (compared with European average of 57%).
2. 82 % have already initiated an internal project for switching to IAS (European average 55%).
3. Nearly 90% of German listed (surveyed) firms have already analysed the differences between GGAAP and IAS (European average 62%).

[122] This survey also includes non-listed firms. However, these points are only about the listed firms.

4. Over 44% are involved in lobbying the International Accounting Standards Board (IASB) (European average 20%).

5. 80% believe that the use of IAS will bring about a higher degree of transparency and comparability between financial statements (European average 73%).

In general, it can be noted that Germany on these points (and the majority of other points which are not listed here) is above the European average in the move towards IAS. This survey concludes that the fact that German firms have been able to use IAS for many years without the need for reconciliation to their local GAAP is a key factor behind their advancement in this area.

4.10 The implications of this chapter for the current research:

This chapter clearly indicates that German accounting is less value relevant than IRAS. It also indicates that in the last few years managers of German companies have had a more positive view of IRAS (and its importance for shareholders and internal reporting) compared with the early nineties. This background is essential in understanding some of the motives for adopting IRAS, which underline the hypotheses in Chapter 5. For example, the argument that German GAAP is less value relevant implies that firms using it may suffer some competitive disadvantage in the capital markets as compared to firms using IRAS. On the other hand, firms adopting IRAS may lose some flexibility in earnings management. The potential for earnings management clearly exists in German GAAP, but there is (arguably) less scope under IAS and more restrictions on it under US GAAP.

It is also understood from this chapter that German accounting lacks regulations on some important issues, whereas US GAAP, for example, is widely known to be extensively regulated.

5 Chapter 5: Literature Review and hypotheses development

5.1 Introduction:

This chapter has two main goals: First is to provide a review of the literature which focuses on the main topic of this research. Second is to develop through a review of the related literature a set of hypotheses that will be tested in this research.

As explained in Chapter 1, the current research aims to explain the choice of accounting standards by German listed firms. The choice between G GAAP, IAS or US GAAP is a decision which belongs in the literature about firm behaviour. To the researcher's knowledge, very few financial studies have focused on this particular issue.

Due to the limited number of studies of the voluntary adoption of a specific set of accounting standards, studies of this type exploit the fact that there is a parallel literature on another related issue with a similar background, which they use to justify their hypotheses. An important common factor between these studies is that all of them hypothesise that particular firm characteristics are determinants of the managerial decisions regarding accounting practices. In general, they examine the determinants of the following: voluntary disclosure, the extent of compliance with mandatory disclosure, voluntary purchase of audit services, voluntary compliance with IRAS, the choice of IAS or US GAAP and finally, the extent of observance of IRAS. All the studies surveyed in this chapter are shown in Table 5.1.

It is important to indicate that the basic idea of the current research is based on the work of Dumontier and Raffournier (1998), who examine the voluntary compliance with IAS by Swiss companies. The authors assume that disclosure under Swiss GAAP is much lower than under IAS. Hence, they consider that voluntary disclosure and the purchase of discretionary audit[123] is behaviour whose costs and advantages are similar to voluntary compliance with a particular set of accounting standards such as IAS. As a consequence, the hypotheses which had been used to explain voluntary disclosure were used to explain the behaviour of the adoption of IAS by Swiss companies.

[123] In general, this means the appointment of auditors voluntarily where the use of auditors is not required by Law such as in the case of quarterly reviews (in many countries).

Like Swiss companies, German companies adopting IRAS are committing themselves to increased levels of disclosure (Leuz and Verrecchia (LV), 2000). Moreover, in general German accounting is considered to be inferior to IAS or US GAAP (see Chapter 4). It is commonly accepted in the literature that use of IAS is associated with increased levels of disclosure. LV (ibid) refer to a statement by The Economist (4/27/1996, p.79) that IAS disclosure requirement are "far tougher than those of most countries". Furthermore, Leuz and Wüstemann (2004, p.475) empirically proved that the level of public disclosure by German firms is lower than that by UK and US firms and that 'financial statements of German firms are generally less informative than those of the UK or US" (see Chapter 4). In this case, it is acceptable to consider voluntary compliance with accounting standards such as IRAS as similar to voluntary disclosure. In other words, the higher levels of disclosure required by IRAS make it logical to expect that the factors which drive voluntary disclosure will be similar to the factors which lead a firm to adopt a particular set of accounting standards such as IAS or US GAAP.

Very recently, Weißenberger et al (2004) published their survey-based work on the choices of accounting standards in the German market. They also examine the factors leading German companies the choose IRAS rather GGAAP and those leading them to choose IAS rather than US GAAP (or vice versa). Although, it seems that they are testing the same decisions examined in the current research, they chose a very different approach. Whereas Weißenberger et al investigate (the assumingly) direct motives of firms behind the choices (see Table 5.1), the current research examines the characteristics of the firms making the choices. Still, studying the characteristics of these firms is an indirect way of examining these motives. For example, in the discussion on firm size presented below, we study all the possible motives that may lead managers of larger firms to adopt IRAS. While Weißenberger et al survey companies on these motives, the current study tries to through some light on motives through the relationship between different characteristics and the choices (see Chapter 1 and also Table 5.1 below for further details on Weißenberger et al's study).

The current study is based on financial statements for the financial year ending between December 2001 and September 2002. Therefore, any improvements in the

quality of German GAAP which were introduced after this date will not affect the hypotheses (see Chapters 2, 3 and 4).

5.2 A brief outline of the studies on compliance with IRAS:

The studies considered in this section are those concerned with voluntary adoption of IRAS and the choice of IAS or US GAAP. It is important to note that a substantial part of the literature review, including the hypotheses and results of the related studies, is incorporated in the later sections concerned with developing the main hypotheses of the current research. Therefore, to avoid being repetitive, this section is intended to present a very brief outline of these studies.

Samples: Table 5.1 shows information about the samples in these studies. It can be seen that, whereas some of them focus on a specific country where more than one set of accounting standards are permitted for listed firms such as Germany (Leuz (2003); Weißenberger et al (2004)), Switzerland (Dumontier and Raffournier, 1998), other studies examine samples which comprise companies from many countries (El-Gazzar et al (1999); Cuijpers et al (2002) Ashbaugh (2001); Tarca (2004)).

Hypotheses: As mentioned above all these studies, in general, hypothesise that the choice of a specific set of accounting standards is associated with specific characteristics of the firm. Arguments which support their hypotheses are borrowed to support the hypotheses of the current research (see below). The various variables used to test these hypotheses are shown in Table 5.1.

Statistical analyses: All these studies used logistic regression models for multivariable analysis. This type of regression model differs from that used in disclosure studies. As explained in Chapter 6, the dependent variable in logistic regression is a binary variable that can be used to represent a choice between two alternatives (two sets of accounts, for example). Whereas the disclosure studies use linear regression, in which the dependent variable is of an interval scale (continuous). This can be very useful in this type of study where the level of disclosure is measured in a continuous form using particular indices.

Table 5.1: A survey of the literature on particular companies' behaviours (disclosure, discretionary audit and compliance with accounting standards)

Study/Year/Sample	Country of study	Dependant variables	Independent variables	Conclusion (significant factors)
Disclosure studies:				
Singhvi and Desai (1971)	U.S.A	Quality of corporate disclosure	Size , ownership, listing status, auditing firm, profitability	Firms with **inadequate** disclosure are: small, unlisted, small auditor (non-CPA) and less profitable
Buzby (1975)	U.S.A	Extent of disclosure	Size and listing status	Extent of disclosure is positively associated with size but not associated with listing status (whether it is listed or not)
Firth (1979)	UK	Levels of voluntary disclosure	Size, listing status and auditor identity.	Disclosure is higher in large listed firms. Auditor ID is not associated with it.
Salamon and Dhaliwal (1980)	U.S.A	Voluntary segmental disclosure	Size, new capital issues	Voluntary segmental disclosure is positively associated with size and new capital issues.
Leftwich, Watts and Zimmerman (1981)	U.S.A	Interim reporting	Size, assets in place[124], leverage, ownership, listing status	Interim reporting is associated with listing status (NYSE or ASE), leverage and assets in place
Chow and Wong-Boren (1987)	Mexico	Extent of voluntary financial disclosure	Size, leverage and assets in place	Voluntary disclosure increases with size but not associated either with leverage or assets in place.
Cooke (1989)	Sweden	Voluntary financial disclosure	Size, listing status, parent relationship and industry type	Voluntary disclosure increases with Listing abroad and size. Firms classified as 'Trading' disclose less than others.
Cooke (1991)	Japan	Voluntary financial	Size, quotation status and industry	Voluntary disclosure is higher in

[124] Fixed assets; most of the studies measure the proportion of assets in place (book value of fixed assets to book value of total assets)

Study/Year/Sample	Country of study	Dependant variables	Independent variables	Conclusion (significant factors)
		disclosure	type	large, multiple listed [125] and manufacturing firms
Craswell and Taylor (1992)	Australia	Discretionary disclosure of reserves	Size, leverage, cash flow risk[126], ownership, auditor Identity	Discretionary disclosure increases in firms with a big-8 auditor. (Size is influential but only in univariate analysis)
Lang and Lundholm (1993)	U.S.A	Voluntary disclosure as rated by FAF[127]	Size, performance and security issuance.	Disclosure as rated by analysts increases with size, security issuance (current and future) and firm performance. Furthermore, it decreases with the correlation between earnings and returns[128]
Ahmed and Nicholls (1994)	Bangladesh	Degree of mandatory disclosure compliance	Size, total debt, multinational company influence[129], qualifications of accountants[130] and size of auditing firm.	Mandatory disclosure is positively associated with being a subsidiary of a multinational firm and having a large auditor.
Hossain, Tan and Adams (1994)	Kuala Lumpur	Extent of voluntary financial disclosure	Size, ownership, assets in place, leverage, audit, listing status	Voluntary disclosure increases with firm size, ownership structure and foreign listing.
Hossain, Perera and Rahman (1995)	New Zealand	Extent of voluntary financial disclosure	Size, leverage, assets in place, auditor, listing status	Voluntary disclosure increases with size, leverage and listing

[125] In this study and the previous one Cooke classifies firms as unlisted, listed, multiple listed. Cook (1991) finds that multiple listed firms disclose more than firms only listed on TSE, which in turn disclose more than unlisted firms.
[126] Volatility of equity returns (idea is that riskier firms face higher-related agency costs, consequently disclose more).
[127] Financial Analysts Federation
[128] Performance is measured by many measures of both returns and earnings. Yet, correlation between returns and earnings is used to surrogate for information asymmetry
[129] Whether the firm is a subsidiary of a multinational firm or not
[130] Professional qualifications of the principal accounting officer in the company

Study/Year/Sample	Country of study	Dependant variables	Independent variables	Conclusion (significant factors)
				status
Naser and Wallace (1995)	Hong-Kong	Comprehensiveness of mandatory disclosure	Size, listing status, performance, liquidity ratios, leverage, scope of business, outsiders' ownership and auditor identity	Comprehensiveness (fullness) of mandatory disclosure is positively associated with size, profitability, having a big auditor and scope of business.
Inchausti (1997)	Spain	Level of both voluntary and mandatory disclosure by Spanish firms	Size, cross listing, profitability, leverage, auditor identity, industry and dividend payout.	Levels of disclosure are positively associated with size, auditing firm, cross listing (international listing).
Leuz (2004)	Germany annual reports for the fiscal year 1996/97[131]	Voluntary disclosure of segment information Voluntary disclosure of cash flow statement	Trading volume, profitability, capital intensity, firm size, leverage, free float, diversification and foreign listing and foreign sales. (same factors are suggested for both types of disclosures)	Segment reporting is positively associated with capital intensity, size and free float. Negatively associated with profitability and leverage (marginal significance of positive association with trading volume, foreign sales and diversification). Cash flow statement disclosure is positively associated with trading volume, capital intensity free float, foreign sales and size.
Discretionary audit:				
Chow (1982)	U.S.A	Demand for external auditing in 1926	Size, leverage, number of accounting-based debt covenants.	Having an internal auditor is significantly associated with leverage and number of accounting-based debt covenants (size has a limited impact)
Ettredge, Simon, Smith	U.S.A	Voluntary timely quarterly	Size, management ownership,	Quarterly reviews are positively

[131] At that time cash flow statement was not required and mandatory segment reporting was very limited.

Study/Year/Sample	Country of study	Dependant variables	Independent variables	Conclusion (significant factors)
and Stone (1994)		reviews	leverage, new securities issues. Industry type. number of reportable segments, outside directors, total assets invested abroad, % of inventories to total assets and % of receivables to total assets	associated with size, issuance of new securities, leverage and timely review of quarterly data by internal auditors. Negatively associated with management ownership. General conclusion is that purchasing quarterly review is associated with higher internal and external agency costs
Compliance with accounting standards:				
Glaum and Mandler (1997)	Germany (Sample period 1993) in addition to a survey in 1994	Acceptance of Anglo-American norms by German managers	Size, internationalization, foreign investors, tendency for international listing, the need for additional capital, interest in US listing, discretion enjoyed by managers, knowledge and experience with US GAAP, belief in importance of accounting data for decision making; and belief that HGB is being a barrier to international demand for shares	In general, managers who believed that GGAAP limits the demand for German shares abroad are more inclined to accept Anglo-American accounting. Furthermore, size and interest in international diversification of equity capital are also positive factors in accepting Anglo-American accounting.
Dumontier and Raffournier (1998)	Switzerland	Voluntary compliance with IAS by Swiss firms	Size, listing status, internationalization, ownership structure, leverage, capital intensity, profitability, auditors' reputation (big 6)	Voluntary compliance with IAS is positively associated with size, internationality, auditor ID and ownership dispersion.
El-Gazzar, Finn and Jacob (1999)	International (different	Voluntary compliance with IAS by multinational firms	Foreign revenues, number of foreign listings, leverage, and EU	Voluntary compliance with IAS is significantly associated with

Study/Year/Sample	Country of study	Dependant variables	Independent variables	Conclusion (significant factors)
	countries)		membership of the country of domicile[132].	internationality, cross listing, leverage, country of domicile (all the hypothesised factors)
Ashbaugh (2001)	UK (non-US /non UK firms listed on LSE) (Sample period: 1993/94)	Voluntary disclosure of IAS or USGAAP information[133] by non-US firms listed on LSE.	Number of foreign listings, occurrence of firms' stock issuance, requirements of a firm's domestic GAAP	Disclosing IAS or USGAAP information is positively associated with the number of foreign stock exchanges and the inferiority [135] of the firms' domestic GAAP to IAS or USGAAP, size and US listing
		Voluntary disclosure of IAS[134]	Same factors above	Disclosing IAS is positively associated with size, inferiority of domestic GAAP to IAS, issuing of seasoned equity
		A third model for the choice between IAS and USGAAP	Same factors above	Choosing IAS over USGAAP is positively associated with size and issuing of seasoned equity, but negatively associated with the number of foreign exchanges, listing in the US and the inferiority of domestic GAAP to USGAAP.

[132] The authors hypothesise that companies from EU countries are more likely to comply with IAS.
[133] This includes whether the firm use the accounting set or provide footnote reconciliation either to IAS or USGAAP.
[134] USGAAP and Domestic GAAPs are considered as one choice in this model.
[135] It is calculated by rating the differences where IAS and USGAAP have more restrictions and require more disclosures than domestic GAAPs.

Study/Year/Sample	Country of study	Dependant variables	Independent variables	Conclusion (significant factors)
Cuijpers, Buijink and Maijoor (2002)	EU member states (Sample period:1999/00)	Voluntary adoption of non-local GAAP (IRAS in particular)	Listing status[136], international operations, quality of local GAAP, leverage, ownership concentration, size, industry	Influential factors in adopting non-local GAAP are: size, listing on US, listing on EASDAQ, international operating, low quality of local GAAP
Street and Gray (2002)	32 countries (47 German firms) (Sample period:1998/99)	Extent of compliance with (observance of) IAS	Listing status, size, profitability, industry, manner of reference to IAS[137], auditor identity, type of accounting standards as stated by the auditor, type of audit standards, quality of GAAP in country of domicile, internationality and size of home stock market	Levels of compliance with IAS are associated with listing status, auditor ID (big5+2), the manner of reference to IAS, and country of domicile.
Leuz (2003)	Germany Neuer Markt (Sample Period: 2 years: 1999 and 2000)	**Main purpose:** Information asymmetry under IAS compared with that under US GAAP. DV is either bid-ask spread or share turnover as proxies for information asymmetry[138] **Secondary purpose:** The choice between IAS or	Choice of GAAP (IAS/US), size, volatility, free float, included in NEMAX 50 or not (largest 50 Neuer Markt companies in terms of market capitalization) Size, financing needs, performance,	There are no significant differences in information asymmetry between IAS and US GAAP (see value relevance in Chapter 4) Choosing USGAAP to IAS is

[136] 4 hypotheses about listing status: number of EU stock exchange listings, number of non-EU stock exchange listings, US listing and EASDAQ listing
[137] The manner in which a company refers to IAS in the accounting policies note
[138] Leuz employs main models in which bid-ask spread and share turnover are dependent variables (ID), whereas the choice of GAAP is an independent variable (IAS or US GAAP 0/1) along with other firm characteristics.

Study/Year/Sample	Country of study	Dependant variables	Independent variables	Conclusion (significant factors)
		US GAAP	free float and firms' age and industry.	positively associated with large future financial needs. Firm performance and industry show low significance.
Tarca (2004)	The UK, France, Germany, Japan and Australia (Sample period: 1999/00)	Choice of IRAS or national GAAP.	Foreign revenue, non-US foreign listing, NYSE listing, OTC foreign listed, size, leverage, country of domicile, industry	Choosing between IRAS and national GAAP is associated with foreign revenues, all listing variables, size and country of domicile.
		Choice of adoption of IRAS or supplementary use	Same factors as above	Choosing between adopting and supplementary use of IRAS is associated with foreign revenues, listing on NYSE, size and country of domicile and industry.
		Choice of US GAAP or IAS within: all firms use IRAS (either adoption or supplementary); only firms adopt IRAS; only firms with supplementary use.	Same factors as above	Choice of IAS or US GAAP in firms using IRAS (subsample) is associated with listing on NYSE, country of domicile Choice of IAS or US GAAP in only firms adopting IRAS and in only firms with supplementary use is associated with listing on NYSE and size
Weißenberger, Stahl and Vorstius (2004)	Germany: Neuer Markt and DAX100 A survey based study. Survey was	**Choice between GGAAP and IRAS**	**Financial objectives:** Investor orientation, comparability with industry peers, diversification of investors, internationalisation of investors, increased attractiveness of institutional investors, planning of a	Choosing IRAS is motivated by financial motives: Expectation of attaining improved standing in the capital markets, improved supply of information, diversification and

Study/Year/Sample	Country of study	Dependant variables	Independent variables	Conclusion (significant factors)
	conducted between 2000 and 2001		foreign listing, reduction of cost equity, enhancing of credit rating. **Operating business objectives:** Improvement of product recognition, co-operation with foreign business partners, acquisition, co-operation with foreign with foreign authorities, recruiting international employees, integration of reporting systems and implementation of value-based management systems.	internationalization of body of investors and increased comparability with industry peers. However, operating business motives had minor importance.
		Choice between IFRS and US GAAP	Similarity to GGAAP: is SEC likely to accept IFRS in future, rigour and completeness of the reporting system, flexibility of the reporting system, impact of external advisers, complexity of the process, cost of transition, availability of sufficient practitioner literature on the respective system, expected future of the reporting system in Europe and worldwide, intention of expanding business in the US in different forms.[139]	Adopters of IFRS are supporters of the views that IFRS is: more similar to GGAAP, more accepted in Europe, offers greater opportunities to influence standard setting process. Adopters of US GAAP, on the other hand, are more interested in the US market, and with more global importance.

[139] Although the authors explain the factors or the objectives tested for the choice between GGAAP and IRAS, they do not explain these tested for the choice between IAS and US GAAP, therefore the researcher is unable to provide explanation for some of them.

5.3 Hypotheses on the choice of IRAS or German GAAP in the Main market:

This section provides a detailed justification of the main hypotheses of this research based on the extant literature. Furthermore, results of previous studies are shown separately at the end of the explanation given for each hypothesis. The hypotheses provided in this section are concerned with the choice of IRAS (or G GAAP) in the Main market, which is tested separately from the Neuer Markt. Hypotheses on the choice of IAS or US GAAP both in the Neuer Market and the Main market are presented in a later section at the end of this chapter.

One should note that, for the purpose of this research, all the hypotheses are postulated in both the null and the alternate form.

5.3.1 Firm size

Firm size is the most common factor considered as a significant determinant which might drive a firm's behaviour[140]. In modern economies, companies usually face different legal provisions according to their size, with the legal requirements for large companies differing from those for small sized companies. In Germany, for example, laws define different levels of corporation size. According to these criteria, only large groups, for example, are obliged to draw up group accounts, whereas small groups[141] and subgroups are exempted (Ordelheide and KPMG, 2001, p.1381). Another example is that the proportion of employee members on the supervisory board is determined by the number of employees.

In a country, large companies work in an environment which is, to some extent, different from the one in which smaller firms work, with different laws, different markets, different segments in stock exchanges, different ways of raising funds, and a different relationship with government. For instance, size can be the criterion which determines the segment to which a company may belong on a stock exchange, such as the FWB. Large companies have more chances to market their products in a wider range of markets and to enter markets with barriers to the entry of smaller companies. Moreover, governments usually have special relationships with some large firms through which they try to achieve some economic and political goals.

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[140] The most common factor found in the literature related to the subject of my study.
[141] For size criteria (see Ordelheide and KPMG, 2001, p1378)

This was only a brief introductory summary of some factors which indicate the different environment in which larger firms work.

Many disclosure studies support the hypothesis of a positive relationship between firm size and increased levels of disclosure in financial reporting. Studies by Chow and Wong-Boren (1987), Cooke (1989, 1991), Hossain et al (1994), Hossain et al (1995), Naser and Wallace (1995), Inchausti (1997) and Leuz (2004) are just a sample of many studies which test size as a decisive variable explaining the extent of voluntary financial disclosure by firms.

In the financial literature a variety of arguments are introduced for the size hypothesis. However, it should be emphasised that not all the arguments considered here will be valuable for supporting this research's hypotheses.. The main aim is to review the extant literature on companies' behaviour in terms of the relationship between size and disclosure, purchase of auditing services [142] and choice of accounting practices. The following are the most commonly used arguments in the existing literature:

Agency costs: one of the most important arguments for the size hypothesis is agency costs. Jensen and Meckling (1976) explain that agency costs increase with the amount of outside capital. Agency costs rise as a result of the separation between management and ownership (this includes shares and debt). Conflicts of the interests between managers (agents) and both shareholders (principals) and debt-holders create the need for bonding and monitoring contracts between the mangers and both shareholders and debt-holders. The costs of such contracts are the components of agency costs. Jensen and Meckling (ibid) divide these costs into equity agency costs and debt agency costs. Bonding and monitoring costs of equity will include the costs of external auditing and performance compensation schemes, whereas debt bonding and monitoring costs will include the costs of writing covenants.

Leftwich, Watts and Zimmerman (1981) suggest that in larger firms, the proportion of the capital held by outsiders is higher than in smaller firms. They used the size variable to control for the agency costs of outside capital, because they assumed that agency costs increase with size. Many later studies made use of this notion to argue for size, such as Chow (1982), Chow and Wong (1987), Hossain et al (1994),

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[142] Voluntary auditing which is not required by laws

Hossain et al (1995) and Ahmed and Nicholls (1994). Apart from Chow (1982) who studied voluntary external auditing, all these studies hypothesise that greater disclosure in different forms will reduce agency costs in larger firms.

Ettredge et al (1994, p.138), on the other hand, try to explain why companies purchase timely quarterly reviews (voluntary auditing carried out by external auditors and not required by law). They explain the increase in agency costs and how it is affected by size in two dimensions: internal agency costs and external agency costs. At the internal level the assumption is that "the number and complexity of intra-company relations and, in turn, agency costs increases with the size and complexity of the company" (p.138). In larger and more complex firms, managers cannot control both planning and operations. Thus these activities will be separated and this leads to multidivisional organisations and as a result of that to an increase in internal agency costs. Their explanation about external agency costs was the same as provided by other authors. The following is a general statement by Hossain et al (1994, p337) determining the relationship between increased disclosures and agency costs: "Agency theory predicts that larger firms will disclose more information in their accounts to alleviate the potential for wealth transfers from suppliers or outside capital to managers".

One of the main functions expected from the adoption of an accounting system is monitoring which is a major means of reducing agency costs. If we agree that financial reporting under internationally accepted (or recognised) accounting standards, namely IAS or US GAAP (IRAS) is of high quality[143] and that their superiority to German GAAP is evident, one may argue that the adoption of such standards will serve the goal of reducing agency costs in German companies.

In fact the importance of the argument of agency costs as a function of size might be lessened by the system of corporate governance and ownership structure in German companies, which is different from that in the UK or the US. Block holdings and cross holdings in large German companies' shares is a common feature of German ownership structures. Moreover, the role banks play as owners and representatives with proxy votes[144] on the supervisory board may make our argument less important

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[143] The issue of the value relevance of IRAS is discussed in a different part of this research

[144] In Germany many of small shareholders delegate their voting right to their banks to vote on behalf them (see Chapter 2).

(see Agarwal and Elston 2001; Lehmann and Weigand, 2000). Therefore, the size of German companies may not be such a good proxy for agency costs. To the some extent, the overlap between the size hypothesis and ownership structure is overwhelming in the arguments about agency costs. Therefore, more discussion on this topic is presented in the section about ownership structure (Section 5.3.3).

Costs and benefits: a second factor which supports the hypothesis of size is the cost element. Chow (1982) puts forward the cost-benefit argument in favour of size. The author suggests that costs of setting up a "monitoring/bonding" system are almost fixed and that it is a costly process, especially for smaller firms. Therefore, the marginal cost of operating this system is likely to decrease with firm size. Other studies such as Cooke (1989), Hossain et al (1994) and Ahmed and Nicholls (1994) see that additional activities to produce additional disclosure are costly exercises which small firms cannot afford.

For the cost argument, Dumontier and Raffournier (1998) rely on two opinions. The first is Singhvi and Desai's (1971) argument that in large firms, detailed information is already produced for internal purposes. The second point of view is the argument by Lang and Lundholm (1993) that because of the fixed component of disclosure costs, the cost per unit of size decreases. This latter point of view is nearly the same point which was made by Chow (1982) eleven years earlier.

One can argue that switching an accounting system from one which uses national accounting standards to another one which uses IRAS will be costly to the extent that small firms will not be able to afford it. This last argument by the researcher may be debatable in the case of a sample of German listed companies, which are relatively large. As explained earlier in Chapter 2, German companies which are listed on the German stock exchanges are the largest in Germany. Thus ability to bear the costs of compliance with sophisticated accounting systems may not be a differential factor among these listed companies. However, this argument is introduced just to present a complete overview of the size hypothesis. Moreover, to the researcher's knowledge there is no empirical research which measures the costs of the transformation to IRAS. PricewaterhouseCoopers (2002a) provides a survey of more than 650 chief financial officers (CFOs) across the 15 EU member states with regard to the major changes required to create a single European capital market.

This survey casts light on one major component of the costs of adopting IAS which is training employees, although it does not quantify the costs.

Proprietary costs: a third argument for the size hypothesis is that disclosing detailed information in the financial statements may put small firms at a competitive disadvantage as compared to their counterparts in larger firms in the same industry. Craswell and Taylor (1992) put forward this argument under the name of "proprietary costs". Gray, Meek and Roberts (1995, p48) define proprietary costs as "costs which arise when information is revealed that potentially damages the firm, such as if it results in increased competition or government regulation". Craswell and Taylor (1992) hypothesise that the disclosure of reserves by small Australian gas and oil companies may provide "proprietary" information about their only productive resources while, for large companies, such information may not cover all the reserves of which the managers are aware.

The German market is like most markets in the world in that one finds both small and large firms in the same industry. For example, in the chemicals sector as defined by Deutsche Börse, one can find BASF AG, which a DAX firm[145] and which has 92,545 employees. On the other hand, this sector includes smaller companies such as "SIMONA" with only 1,035 employees[146]. In such a case, a relatively small company like SIMONA, which reports under German GAAP, may face proprietary costs in providing the same level of disclosure as BASF, which reports under German GAAP, but with more voluntary disclosures required under US GAAP[147].

Political costs: The fourth line of reasoning which might support the size hypothesis is the political visibility of large firms. Watts and Zimmerman (as cited in Tendeloo, 2003) point out that larger firms are more likely to choose downward earnings management, because they are more vulnerable to government scrutiny. On the other hand, under political pressure larger companies may need to signal that they are not manipulating earnings by using higher quality accounting rules that restrict earnings management, (and then may be less government intervention).

Other political costs can be the result of the implicit contracts which larger companies have with particular groups in society such as trade unions, consumers

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[145] The largest thirty firms in Germany

[146] both numbers are taken from the annual reports of the companies for the year ended on 31/12/2001

[147] BASF states in its annual report 2001 that accounting standards they use conform to US GAAP to the extent permissible under the German Code.

and environmental groups (Milne 2001). These groups expect larger companies to provide extensive disclosures about their policies concerning employees. marketing and environment. Although this factor may not be strong enough to convince a company to use IRAS, it is only one factor among many that lead firms to seek a more transparent GAAP. Cook (1989) argues that very significant firms in the Swedish economy are vulnerable to additional political costs. He suggests that the adoption of social responsibility accounting in their corporate annual reports is one of the devices they adopt to deal with these additional political costs. Although Craswell and Taylor (ibid) mix this argument with the argument about proprietary costs, they point out that the disclosure of additional information is likely to boost the image of the company. As a result of this it may be able to improve its chances to "muster public support to overturn political actions" (ibid, p.300).

Hossain et al (1994) suggest that higher taxation is an example of political intervention. However, this argument about reducing the political costs related to higher taxation may not apply to German companies adopting IRAS, as German consolidated accounts are not the basis for taxation. So the adoption of IRAS should have little impact on taxation.

Analysts following: Hossain et al (1994) put forward an argument by Barry and Brown (1986) suggesting that the annual reports of large companies are more likely to be examined by financial analysts. Therefore they have an incentive to voluntarily disclose more information than smaller companies as non-disclosure may be taken by investors as "bad news". Furthermore, Lang and Lundholm (1993) argue that incentives for private information acquisition are greater in larger firms. Hence, profit for trading private information is higher in larger firms. As a result of this, larger firms may face greater demands for more disclosures. Furthermore, one can also argue that with little disclosure analysts may be inclined to recommend a Buy because of associated uncertainty.

Several studies in the literature, such as Hussain (2000) and Hope (2002), prove that firms' size is positively correlated with analyst following.

Results of previous research: Most of the studies in the literature support the size hypothesis. Chow and Wong-Boren (1987), Cook (1s989, 1991), Hossain et al (1994, 1995), Naser and Wallace (1995), Inchausti (1997), and Leuz (2004) are just a

sample of the studies which show a significant positive relationship between size and companies' financial disclosures. Studies by Chow (1982) and Ettredge (1994) find that size is an explanatory variable in companies' decision to have their accounts audited voluntarily. Finally, Dumontier and Raffournier (1998) find a significant positive relationship between size and the propensity of Swiss companies to comply with IAS.

Conversely, Zimmerman and Gontcharov (2002) examine whether the choice of accounting standards affects the level of earnings management. The authors indicate that according to their samples, companies using IAS and US GAAP sample are smaller that those using German GAAP. This in fact may conflict with all the arguments above. However, the reason for this unexpected result may be the use of limited sample. Their sample includes companies in DAX, MDAX and NEMAX 50 and excludes a substantial part of German listed firms such as those in SMAX and those which are not classified. Yet, it is an interesting result because it contradicts all the expectations and the arguments for size stated above.

Relying on all the previous arguments and the results of previous empirical work, the researcher presents the following hypothesis:

$H1_0$ **:** Ceteris paribus**,** the tendency to adopt IRAS by German listed firms is not associated with size or negatively related to company size.

$H1_1$ **:** Ceteris paribus**,** the tendency to adopt IRAS by German listed firms is positively related to company size.

Variables offering a proxy for size: there is a variety of variables suggested in the literature as proxies for size. Cooke (1989, 1991) suggests three proxies for size: annual sales, total assets and number of shareholders. Because of the major multicollinearity revealed between these variables, Cooke uses them in three separate regression models. The number of shareholders as a proxy of size can be easily criticised. In a large firm with highly concentrated ownership, the number of shareholders can never be the perfect proxy for size. Chow (1982), Chow and Wong-Boren (1987), Leftwich et al (1981) suggest the sum of the market value of the equity and the book value of debt. Although this measure for size is quite common in the literature, it can be also criticised. With the volatility of share prices, market value cannot be a consistent measure of size. A perfect example of this is the high-

tech boom in the late nineties. Some researchers, on the other hand, may prefer to avoid the impact of the accounting numbers by choosing the number of employees as a proxy of size. None of the studies in the literature reviewed by the researcher uses the number of employees. However, research on other issues employs this proxy (see Bergstrom, 1998 and Santalo, 2002).

From the variables discussed above, the researcher has chosen the variables: total assets, turnover and the number of employees. The latter is chosen to provide a different measure of size which is not influenced by accounting measures.

5.3.2 Hypothesis on quality segments:

As explained in Chapter 2, prior to 2003, Frankfurt Stock Exchange (FWB) had three quality segments, which are organized by law: DAX, MDAX and SMAX. Although the main criteria for including companies in DAX and MDAX are size and exchange turnover, the inclusion of firms in SMAX was not related to firm size. In general companies in these three segments are required to adhere to additional transparency requirements. Conditions for participating in these segments include: having a minimum free float of 20%, producing quarterly reports, holding one analyst conference per year and disclosure of the shareholdings of management and supervisory board members (Deutsche Börse AG, 2001)

The researcher would argue that German firms which are classified in one of these segments are more likely to use IAS or US GAAP. First, nearly half the firms classified in these segments are amongst the largest firms in Germany. Therefore, the size effect is expected to be significant within these segments. Detailed arguments for the size impact are presented above in this chapter. However, one may argue that this classification would be a proxy for size, so that there is no need to test it separately. Still, this is not entirely true, because many of Germany's largest firms are not in DAX or MDAX (or even SMAX). For instance, Bertelsmann AG, Hoechst AG and Energie Baden-Württemberg AG were among the largest 30 firms in terms of three measures of size: turnover, total assets and employee numbers [148]. nevertheless they are 'unclassified' (are not in quality segments). Furthermore, nearly 23% of the largest 70 German firms were not classified in DAX, MDAX or

[148] Vattenfall Europe AG is among the largest thirty but only in terms of total assets. On the other hand Spar Handels AG is also among the largest 30 but in terms of employee numbers and total revenues.

SMAX (e.g. Porsche AG. SAI Automotive AG and Debitel AG)[149]. In addition size is not a criterion for inclusion in SMAX. As described by Deutsche Börse (2001. p.8), SMAX "was developed to provide these companies with a stage to tell their story. Thus they can rise above the mass of second-tier stocks and increase their attractiveness for analysts and investors". SMAX firms were also required to adopt IAS or US GAAP from 2002 onwards (This was of course before the closure of SMAX in 2003[150]) (Deutsch Börse, ibid). For these two reasons SMAX firms are considered more likely to report in accordance with IRAS.

Firms in these quality segments have to produce more transparent accounting which might be associated with a greater tendency to use IRAS. In addition SMAX members have voluntarily subjected themselves to this regime of greater transparency.

Based on the arguments above, the following argument is suggested for empirical testing:

$H2_0$: Ceteris paribus, the tendency of German firms to voluntarily adopt IRAS is either not associated to being either in SMAX, MDAX or DAX or negatively with it.

$H2_1$: Ceteris paribus, the tendency of German firms to voluntarily adopt IRAS is positively associated to being either in SMAX, MDAX or DAX.

This hypothesis will be examined using a binary variable (see Chapter 7).

5.3.3 Hypothesis on Ownership structure

The separation between ownership and control is a substantial characteristic of firms in a modern economy. This separation generates agency costs resulting from conflicts between managers and shareholders. The researcher prefers to present a simple definition of ownership structure for the purpose of introducing the arguments related to this hypothesis. Ownership structure may be defined[151] as the allocation of companies' shares between investors. It should show the concentration of shares and proportions of equity held by outsiders and insiders (management).

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[149] As the classification at the end of 2001

[150] Recall the sample period of the current research is 2001/2002.

[151] A simple definition suggested by the researcher to introduce the argument and the hypothesis.

It should be indicated here that ownership structure and size are quite interlinked. In fact, the argument about agency costs in the previous section on the size hypothesis is mainly based on the effect of size on the form of ownership structure and, in turn, on the existence and size of agency costs. The way the ownership of a firm is structured may determine the level of agency costs in the firm. For example, in a firm owned completely by managers, there will be no external agency [152] costs because there is no separation between ownership and control. On the other hand, in a firm with outside shareholders, external agency costs will emerge. However the allocation and concentration of these shares held by outsiders can be a decisive factor in the size of the agency costs.

The ownership hypothesis is discussed by different researchers from different points of view. As will be seen below, literature on the impact of the ownership structure on accounting is discussed from different perspectives. While some authors discuss the impact of management ownership (management shareholding), others discuss the impact of the diffusion of ownership. The aspect of ownership structure studied by Hossain et al (1994), Craswell and Taylor (1992) and Dumontier and Raffournier (1998) is the diffusion of shares, whereas the aspect studied by Chow is management shareholdings. Leftwich et al (ibid), on the other hand, look at the involvement of banks and insurance companies (outside directors) in firms' decisions.

Chow (1982) hypothesises that the propensity to engage in voluntary auditing is negatively related to managers' ownership share. His idea is that, since the conflict between the manager and the firm's shareholders is negatively related with managers' ownership share, the need for the voluntary external auditing is also negatively related with this (less agency cost and less need for monitoring).

Dumontier and Raffournier (1998) suggest that accounting is a means which principals may employ to monitor their interests. Thus they argue that in order to play an effective role in monitoring, accounting should not give the opportunity to managers to manipulate accounting numbers by using inadequate methods or employing frequent accounting policy changes. Their idea was that International Accounting Standards may be more efficient than Swiss accounting principles in achieving the monitoring role of accounting (less flexible and with more disclosure).

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[152] as discussed in the size hypothesis, Ettredge (1994) divides agency costs into internal and external costs

The authors' hypothesis was that shareholders of firms with relatively dispersed ownership are more likely to impose IAS as a monitoring activity, while managers would impose it as a bonding activity.

Drawing on Holthausen and Leftwich (1983), Craswell and Taylor (1992, p.299) state that, although it is difficult to determine to what extent a firm is owner rather than manager controlled, "the extent to which ownership of the firm is widely held, rather than closely held is likely to reflect this distinction". Therefore they suggest that managers of firms with relatively diffuse ownership are more likely to disclose quantified information about reserves[153]. With a similar idea, Hossain et al (1994) state that in firms in which share ownership is widely held, interest conflicts between principals and agents are more likely than in more closely held firms. Voluntary information disclosure is expected to be greater in the first type of firm, so that principals can efficiently monitor their wealth, and managers can signal to owners that they are acting in their best interests.

Finally, the researcher suggests that the peculiar ownership pattern in Germany may influence the logic of the arguments employed above. Many aspects make German ownership and governance structure very different from other countries such as the US and the UK. Such aspects are: concentrated firm ownership, strong bank presence and family ownership. The following quote from Franks and Mayer (2001, p.944) may give a good brief description:

> "Germany is a good example of an insider system. It has fewer than 800 quoted companies, compared with nearly 3000 in the United kingdom, and 85% of the largest quoted companies have a single shareholder owning more than 25% of voting shares. Corporate ownership is characterized by a strikingly high concentration of ownership, primarily in the hands of families and other companies. Corporate holdings frequently take the form of complex webs of holdings and pyramids of intercorporate holdings. Bank control influence and control are extensive where shareholdings are widely dispersed"

Franks and Mayer (ibid) provide an example of the pyramid structure in German companies: at the beginning of the 1990s, Daimler Benz had two block-holders,

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[153] Their study is about disclosure of reserves in Oil companies

Deutsche Bank (28.37%) and Mercedes Automobil Holdings (25.23%) (Level one of the pyramid). Nearly 50% of the shares of Mercedes Automobil Holdings, in turn, were owned in equal proportions by two German holding firms, Stern and Stella (level two of the pyramid). Stern and Stella, sequentially, had four block-holders (level three of the ownership pyramid).

Results of studies examining the effect of ownership structure are mixed. Studies by Craswell and Taylor (1992), Raffournier (1995) and Wallace and Naser (1995) find that there is no significant relationship between ownership structure and the extent of disclosure. However, Hossain et al (1994) and Ruland, Tung and George (1990) find that this factor is significantly related to voluntary disclosure levels. Leuz (2004) finds that firms' free float is positively associated with cash flow and segment disclosures by German companies. For the studies related to compliance with IRAS, Dumontier and Raffournier (1998) conclude that ownership structure has an important influence on the tendency of Swiss companies to comply with IAS. On the other hand, Cuijpers et al (2002) find that ownership structure is not correlated with the tendency of firms to adopt non-local GAAP. However, the authors explain that this result is related to choosing the concentration of ownership as a proxy for ownership structure, which is considered by the authors as an imperfect proxy for ownership structure. Contradiction in the results of the different studies may be explained by various traditions of corporate governance in different countries and differences in organisations' cultures. The unique corporate governance system in Germany makes it more interesting to test whether this peculiar structure would lead to a different result from the one found by other researchers.

In short, whereas some arguments above are about the impact of the proportion of free float, another stream of arguments are concerned with the impact of management ownership. The following hypotheses are postulated to represent these two streams, in addition to another hypothesis which is concerned with the influence of banks on the companies' GAAP choices.

Drawing on these arguments, the researcher would introduce the following hypothesis:

$H3a_0$: Ceteris paribus, the tendency of German firms to voluntarily adopt IRAS is either not associated with the dispersion of share holding or negatively related with it.

$H3a_1$: Ceteris paribus, the tendency of German firms to voluntarily adopt IRAS is positively associated with high dispersion of share holding.

$H3b_0$: Ceteris paribus, the tendency of German firms to voluntarily adopt IRAS is either not associated with the proportion of outside ownership or positively related.

$H3b_1$: Ceteris paribus, the tendency of German firms to voluntarily adopt IRAS is negatively associated with the proportion of outside ownership.

$H3c_0$: Ceteris paribus, the tendency of German firms to voluntarily adopt IRAS is either not associated with the presence of banks through their representatives on the supervisory board or positively related.

$H3c_1$: Ceteris paribus, the tendency of German firms to voluntarily adopt IRAS is negatively associated with the presence of banks through their representatives on the supervisory board.

It was not possible to test this hypothesis on bank representatives because of the lack of data (see Chapter 6).

Variables used to proxy for ownership structure in previous studies: most of the previous studies employed ownership concentration as a proxy for ownership structure. However, the way the concentration is calculated varies in these studies. These differences are related to many factors such as the availability of data and the researchers' personal points of view. Craswell and Taylor (1992), for example, used the percentage of shares held by the largest 20 shareholders. Disclosure of this piece of data is required by the Australian Stock Exchange. Hossain et al (1994) use the percentage of shares held by the largest ten shareholders. Chow (1982), on other hand, derived his proxy for the average percentage ownership of common stock held by officers and directors for a number of industries[154]. However, the latter describes the limitations of this variable which is used just because of lack of data available for that year. Dumontier and Raffournier (1998) use the free float, whereas Cuijpers et al (2002) calculate a Herfindahl index based on the ownership percentages of the ten largest shareholders of a company. The latter indicate that they prefer "inside" versus

[154] this proxy is derived from Federal Trade Commission (FTC) statistics in its 1926 publications (see Chow, 1982, p288)

"outside" ownership to ownership concentration; nevertheless such data was not available to them.

For the purpose of this research, three types of proxies should be adopted. For the hypothesis on the dispersion of shares, the ownership structure (e.g. free float or ownership concentration) may be the most suitable proxy. For the second hypothesis, the proportion of equity held by managers can be a good proxy.

However, different methodological issues rose with collection of data. For example, the large number of firms where the management ownership is zero led the researcher to change the variable to a binary variable. This change has an implication on the hypothesis itself (see Chapters 6 and 7).

5.3.4 Leverage

The ratio of debt of a firm to its equity is known as "gearing" in the UK and "leverage" in the US. The leverage ratio show how the capital of a firm is structured (capital structure). This ratio differs across firms in a single country and at an aggregate level, leverage differs across countries. Differences in leverage level across companies in a single country are directly linked to managerial and financial decisions and can be influenced by several factors such as investment decisions and the firm's cost of capital. In addition to that it can be influenced by firm-specific characteristics such as size. Differences across borders can be influenced by factors such as interest rates and cultural dimensions (Islamic culture, for example)[155].

In contrast with several studies, Rajan and Zingales (1995) find that at an aggregate level, firm leverage is comparatively similar across the G-7 countries with the exception of the UK and Germany (surprisingly[156]) which are found to be relatively less levered. Yet, it is not the concern of the current research to discuss the factors that affect leverage. Moreover, Mayer (2000) reports that "bank oriented systems" are expected to be characterised by high levels of bank finance. On the other hand, he indicates that unlike Japan, bank lending to corporations in Germany is not high in comparison with the UK and US (see also Franks and Mayer, 2001) (see Chapter 2 for more discussion).

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[155] This introduction is based on a personal point of view without a specific reference.
[156] Germany traditionally is associated with high leverage (see Chapter 2)

Leverage in this research is to be tested as a determinant affecting German listed companies' choice of accounting standards for their financial reporting. The relationship between leverage and accounting practices has been a subject of different studies from different perspectives.

Jensen and Meckling (1976) argue that managers of highly levered companies will have a strong incentive to engage in risky activities which promise high profits with a low probability of success. Gains from the success of such activities will be captured by owner-managers, whereas their failure will be borne by creditors. This argument suggests that potential wealth transfers from debt-holders to shareholders increase as leverage increases. Most of the arguments in the literature on leverage and its effect on managerial decisions and accounting practices were based on this suggestion by Jensen and Meckling (e.g., Leftwich et al (1981), Craswell and Taylor (1992), Hossain et al (1994), Hossain et al (1995), Dumontier and Raffournier (1998)). The main notion of the disclosure studies is that with increasing leverage, agency costs increase and increased disclosure is required to reduce them. Components of agency costs associated with debt as reported by Jensen and Meckling (1976, p.342) are the following: "1. the opportunity wealth loss caused by the impact of debt on the investment decisions of the firm, 2. the monitoring and bonding expenditures by the bond holders and the owner manager (i.e., the firm) and 3. the bankruptcy and reorganization costs."

The idea of agency costs caused by the conflict of interests which arises between shareholder and debt-holders and using accounting practices to reduce them is criticised by Schipper (1981) in her comments on the work by Leftwich et al (1981)[157]. She suggests that such a conflict could be solved by bond covenants. Schipper argues that if managers are attempting to transfer wealth from bond-holders to shareholders, this will mean that they are acting in the interest of shareholders and that there is no agency problem in this case. Moreover, she argues that if the managers are maximising their own wealth using firm assets, they will do so regardless of the proportion of debt to equity. Still, her argument above is based on the concept that agency costs exist by virtue of the relationship between shareholders

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[157] One of the earliest studies examined the relationship between leverage and accounting practices (interim reporting)

and managers, while she disregards another type of agency costs which is created by the relationship between debt-holders and managers (defined above).

The relationship between accounting and leverage may take various forms. In some cases the process of setting debt covenants, which are a tool for monitoring the agency relationship between management and debt-holders, make use of the accounting figures. Furthermore, debt covenants may also refer to accounting data when they impose constraints on leverage ratios (Weintrop, 1990). On the other hand, in some countries financial statements can be an essential information resource for banks (as loan providers) and bond-holders. This explanation about the relationship between accounting figures and covenants may support the argument that using high quality accounting standards will give the financial statements of a firm more credibility and make them more reliable for banks and other investors in debt securities.

Craswell and Taylor (1992) indicate that managers tend to avoid accounting methods which lead to probable violation of technical borrowing limitations expressed in accounting numbers. Dumontier and Raffournier (1998) argue that the volatility of profits can be used to monitor the agency relationships between shareholders and creditors. Therefore, using accounting standard which restrict earnings management helps in facilitating this monitoring role, which is more needed in highly levered companies. However, although the role of US GAAP in restricting earnings management is fairly evident in the literature, the role of IAS in restricting earnings management is still debatable (see Chapter 4 for a discussion on this issue).

Another argument for a positive relationship between the need for increased disclosures and leverage is that the increase in leverage will make lenders more cautious about their position and priority for payment in case of bankruptcy, for example. More disclosure and the use of sophisticated accounting standards may make firms less risky (reduce information asymmetry) and encourage lenders to provide more debt.

However, although the arguments above adopt the view that there is a positive relationship between leverage and disclosure, a negative relationship also can be justified through another stream of arguments. Zarzeski (1996, p 24) proposes that companies with lower leverage are likely to "have higher levels of investor-oriented

disclosure". The explanation provided is that companies with high leverage are expected to exist in countries with high uncertainty avoidance (conservatism), developed bank-firm relationships and cross-holding ownership (Germany as discussed in Chapter 3). In such cases firms will share private information with their creditors.

According to Agarwal and Elston (2001), German banks may engage in managerial decisions conforming to their position as debt-holders rather than shareholders or representatives with proxy votes. Thus, more disclosure and a high quality set of accounting standards may reveal such behaviour to the public and other investors. This potential result may support the argument that high leverage will negatively affect the tendency of German companies to adopt IRAS.

Furthermore, Tarca (2004) argues for using leverage as a proxy to capture the firm's dependence on equity capital. This implies that firms with higher leverage are relatively less dependent on equity capital, and are hence less likely to face shareholders' demands for information. This, in turn, means less pressure to use disclosure to reduce information asymmetry with shareholders.

Rajan and Zingales (1995) find that leverage increases with size in all countries (G7) except for Germany, in which the relationship between leverage and size was significantly negative. They explain that this is against all the theoretical expectations; nevertheless they do not provide an explanation for this. Spremann and Gantenbein (2001, p.18) explain that this negative relationship "reflects the legal specialities of German corporate and bankruptcy law as well as the special relationship between SMEs and their banks". Edwards and Fischer (1994, p.129) also report that the largest companies in Germany have a general tendency not to raise much finance from banks. Given the hypothesised positive relationship between size and adoption of IRAS, one would expect leverage in German firms to have an inverse relationship with their tendency to use IRAS.

Leuz (2004), on the other hand, does not expect any particular sign for the relationship between leverage and disclosures of cash flow statements and segment reporting by German companies. He justifies this in relation to the special features of the German institutional environment. In his results he finds a positive relationship between the disclosure of cash flow statements and leverage. However, a negative

relationship is found between segment reporting by German companies and leverage. The positive association for the disclosure of a cash flow statement is explained by the high demand for cash flow statements, in particular for highly levered firms. whereas the negative relationship between segment reporting and leverage is related to cost savings in private information acquisition, which are interpreted by the researcher as a result of the ability of managers in highly levered companies to share private information with lenders. When introducing his hypothesis about leverage, Leuz reports that although bank debt agreements in Germany are widespread, banks have other means than the annual report to receive the information they need.

Results of previous studies: results of previous studies about leverage influence are varied and not all of them are consistent with the predictions of agency theory. Chow (1982) and Ettredge et al (1994) find a positive relationship between the firm's leverage and voluntary auditing. For voluntary disclosure studies, Chow and Wong-Boren (1987) conclude that there is a positive but insignificant relationship between leverage and voluntary disclosure. The univariate analysis by Craswell and Taylor (1992) provides an insignificant result, whereas the multivariate analysis proves a significant positive correlation between leverage and the disclosure of reserves by oil and gas companies. Hossain et al (1994) find that leverage in the univariate analysis is marginally significant. The multivariate test shows that it is insignificant; nevertheless mistakenly they state that their results are consistent with Craswell and Taylor (1992). Yet Hossain et al (1995) find a marginally significant relationship between leverage and voluntary disclosure. With regard to studies related to compliance with IRAS, Dumontier and Raffournier (1998) find that the relationship between the propensity to comply with IAS and leverage is not significant. Furthermore, Cuijpers et al (2002) conclude that they do not find any evidence of the impact of leverage on the probability of using non-local GAAP. Street and Gray (2002) do not assume any relationship between leverage and the extent of compliance with IAS.

In general, as can be seen from the above, there is no strong evidence in the literature that supports the leverage hypothesis. Although there are a few arguments for a positive relationship between leverage and the tendency to adopt IRAS, another stream of arguments supporting a negative relationship appear to overshadow them. Therefore, the researcher tends to favour this last group of arguments.

$H4_0$: Ceteris paribus, the tendency of German companies to voluntarily adopt IRAS is either not associated with leverage or positively with it.

$H4_1$: Ceteris paribus, the tendency of German companies to voluntarily adopt IRAS is negatively associated with leverage.

Proxies for testing leverage: Although the leverage concept as defined above is in general the same in the finance and accounting literatures, the way it is measured may differ across the different studies according to different perceptions about debt and equity. Chow (1982) and Chow &Wong-Boren (1987), for example, suggest book value of debt to size, which is in turn measured by the market value of owners' equity plus book value of debt. Hossain et al (1994) and Hossain et al (1995) measure leverage by book value of long-term debt to the book value of owners' equity. Ettredge et al (1994), on the other hand, measure leverage by long-term debt as a percentage of total assets. Dumontier and Raffournier (1998) suggest two measures for leverage: total debt to total assets and long-term debt to total assets. For the purpose of this study, total debt to total assets is proposed as a measure of leverage (see Chapter 6).

5.3.5 Profitability

Profitability is a significant variable which affects different groups of financial statements users. Figures related to profitability are used by analysts and investors to evaluate companies' performance. The importance of profit figures have persuaded many researchers to think that profitability can have an effect on managers' behaviour which includes the choice of accounting practices.

Some of the studies about disclosure and its determinants examine the relationship between firms' profitability and the extent of financial disclosure by these firms.

Inchausti (1997, p.54) employs three theories to explain the probable impact of profitability as a determinant of profitable firms' disclosure. He suggests that according to agency theory, managers exploit profitability to attain personal advantages using external information. Hence, detailed disclosure will help them to keep their position and their compensation arrangements, although profit related pay in Germany is not as frequent as it is in the UK and US. Second, he argues that according to signalling theory, shareholders will be interested in signalling "good news" (by their companies) to the market in order to avoid undervaluation of their

shares. Finally, the author suggests that "political process theory" implies that very profitable firms will disclose more information in order to justify the level of profits. Furthermore, Lang and Lundholm (ibid.) indicate that the signalling theory also suggests a negative relationship between disclosure and profitability, where disclosure can be employed to explain "bad news". However, Inchausti (ibid.) indicates that although the signalling theory may suggest two contradictory relationships (positive and negative) between profitability and disclosure of information, given the evidence and underlying reasons, he considers the positive relationship.

Gray, Meek and Roberts (1995b, p.560) provide a similar idea to that explained by Inchausti when they use the statement by Akerlof (1970) "there is a cost in being perceived as a "lemon" by the market". Based on this, they suggest that "well-run" firms will employ voluntary disclosure to be distinguished from other firms with lower performance, in order to raise capital on the best available terms.

Leuz (2004), on the other hand, mixes the argument for profitability with the industry hypothesis by stating that in industries where proprietary costs are likely to be high (high competition), profitability is likely to be negatively associated with disclosure.

Dumontier and Raffournier (1998) argue that firms with superior profits may employ IAS as a signal to the market that they do not manage earnings to reduce volatility which is used to measure the risk of companies' shares. Their justification of this argument is that earnings management under IAS is more difficult than under Swiss GAAP. As explained in Chapter 4, earnings management by German companies is evident in companies reporting under GGAAP. However, it is indicated above in the section on leverage that although earnings management is difficult under US GAAP, it may be possible under IAS (see also Chapter 4).

Street and Gray (2002) do not justify the use of the profitability hypothesis. However, they state that they do not predict any direction of association between the extent of compliance with IAS and the profitability of a firm. The reason for this, as reported by the authors, is the mixed findings of previous studies.

In addition to the arguments mentioned above and from the author's own point of view, companies with high profits may tend to associate their superior performance

with distinguishing their company from other companies in the market by using financial reporting of a 'high quality' such as US GAAP and IAS.

In a country like Germany which has a macro-economy-based and statute-based accounting system[158], political pressures are more likely to appear with regard to accounting information. An example of such political pressures can be the pressure put onto profitable companies by labour unions. Labour unions may use high profits to negotiate for higher wages. The argument is that full disclosure required by a high quality set of accounting standards may help companies to explain particular facts about these profits and to stand against such negotiations. However, Leuz (2004) lessens the validity of this argument by reporting that negotiations by labour unions do not take place at the level of the firm and that their representatives on the supervisory board give them private access to such information.

Results of previous studies: Inchausti (1997) does not find any significance in the relationship between voluntary disclosure and the profitability of Spanish firms. Leuz (2004) finds a negative but insignificant association between profitability and cash flow statement disclosures, whereas a significant negative association is found between profitability and segment reporting by German companies. The explanation for this is that proprietary costs related to segment reporting are higher than those related to cash flow statements. For Swiss companies, Dumontier and Raffournier (1998) do not find any significant association between profitability and the tendency of these companies to comply with IAS. Finally, Street and Gray (2002) do not find significant relationship between profitability and the extent of compliance with IAS.

Although the results by Leuz (ibid) indicate a negative relationship between the profitability of German firms and disclosure, based on the arguments above, the researcher tends to hypothesise that:

$H5_0$: Ceteris paribus, the tendency of German firms to voluntarily adopt IRAS is either not associated with their profitability or negatively related with it.

$H5_1$: Ceteris paribus, the tendency of German firms to voluntarily adopt IRAS is positively associated with their profitability.

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[158] As classified by Nobes (see Nobes, 2000, p 59)

Variables used to proxy for profitability: Gray et al (1995b) measure profitability as the ratio of profit after tax and interest to sales (i.e., return on sales). Differently from this, Leuz (2004) provides three measures for profitability: operating income to net sales, operating income total assets (ROA) and ROA relative to industry[159]. Three different measures are presented by Dumontier and Raffournier (1998): net income to equity, earnings before interest and tax to equity, and earnings before interest and tax to total assets. Street and Gray (2002), on the other hand, measure profitability as the ratio of net income before tax to total shareholders' equity. Previous studies do not provide explanations for the proxies suggested. One limitation on all these proxies is that the measured profits may vary significantly from year to year. Despite this limitation, the current research follows the steps of the previous research by choosing the measures: operating income to total assets and operating income to turnover (see Chapter 6).

5.3.6 Auditor Identity:

Auditing is an economic and social activity which has historical roots. However, it has become a crucial activity since the growing separation between ownership and management which first emerged significantly with the industrial revolution. The level of the auditing firm or the identity of the auditing firm is a variable which has attracted many researchers to test whether it has a significant effect on different aspects of companies' behaviour. To present the hypothesis of auditor identity, it is necessary to provide a brief review of the big auditing firms and developments in their size as result of mergers and the extension of their activities.

International auditing firms and work quality: some auditing firms have become international and provide their services across the world through their branches in some countries or jointly with local professionals in other countries. Few studies have explored the relationship between the size of auditing firms and the quality of work they provide. DeAngelo (1981) concludes that the larger the auditor[160], the less the opportunistic behaviour, and the higher the quality of audit. Later research by Palmrose (1988) and Caplan and Raedy (2003) support the conclusion of DeAngelo.

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[159] The last measure as explained by the author is the firm's ROA (earnings before tax, interest and extraordinary items) minus the average ROA of all sample firms with the same industry classification

[160] DeAngelo assumed that the larger companies are the ones which have a larger number of clients.

DeAngelo (1981) suggests that being in the big-8 maybe a good proxy for auditor quality.

The number of audit firms which are considered to be the biggest in the international auditing market and good quality providers has changed several times during the last two decades. In the period of studies by DeAngelo and Palmrose (1960-1985) the number was eight firms: Arthur Andersen and Co, Arthur Young and Co, Coopers and Lybrand, Deloitte Haskins & Sells, Ernst and Whinney, Peat, Marwick, Mitchell & Co, Price Waterhouse and Touche Ross and Co. Mergers took place between some of these firms which led to decreasing the number to six (the Big 6) during the period of the study by Caplan (1975-1995). The so called Big 6 were: Arthur Anderson, Ernst & Young, Coopers and Lybrand, Deloitte & Touche, KPMG and Price Waterhouse. In 1998, a merger between Price Waterhouse and Coopers & Lybrand produced PricewaterhouseCoopers (PwC). Finally, the break-up of Andersen as a result of the collapse of Enron reduced the number to four (the Big 4)[161]. During the years these firms have extended their activities to a wide range of services such as consulting in management and technology and advice on tax and corporate finance.

Data for this empirical research is extracted from the annual reports for the fiscal year 2001. At the time Arthur Anderson was still considered as one of the Big-5. Chapter 3 provides an explanation of the concentration of the German audit market, which shows that PricewaterhouseCoopers and KPMG had the largest market shares.

Relation between auditor identity and firms' behaviours: the identity of auditing firms is a common variable in several studies which have examined different aspects of firms' behaviour. The extant literature is rich with arguments for the influence of auditors. Watts and Zimmerman (1986, p323) argue that

"Auditors have incentives to lobby with the SEC and FASB for more complicated accounting. Such increased complexity could increase the quantity of auditing and the demand for the auditor's services".

However, the authors report that the auditors will oppose complexity if it will decrease the demand for their services. This may cast light on the potential interest that auditors have in recommending a certain set of accounting standard such as IAS

[161] this information is common knowledge and not from a certain reference

as US GAAP. where the Big 5 in particular have an advantage over other firms and auditors generally may be better informed than the preparers of accounts.

Several studies have examined the influence of choosing one of the Big-6[162] firms on different issues related to accounting, particularly in the empirical literature about disclosure. Watts and Zimmerman (1986) indicate that the role of auditors can increase the market value of a firm by imposing increased disclosure and consequently reducing its agency costs. Hossain et al (1994) rely on the arguments of previous agency theory literature which refers to the role of auditors in reducing agency costs by limiting the opportunistic behaviour of agents (see size hypothesis).

Nobes (2000) argues that international accountancy firms are one of the groups involved in the process of accounting harmonisation. His point of view is that their work across the world, which includes preparation, consolidation and auditing of financial statements, will be easier with harmonised accounting practices. Moreover, it will increase the mobility of their staff. The researcher agrees with Nobes and would add that dealing with IRAS will lead to cost savings for these international firms. These cost savings will not be confined to the areas mentioned by Nobes. If their clients use IRAS, international firms will not need to train their staff to deal with an enormous number of GAAPs. Furthermore, it will make it easier and cheaper for the central offices of these firms to monitor the quality of the work achieved by their offices abroad and by other partners. Operating in foreign countries is risky and producing work under their names may threaten their reputation. Thus in some countries where the profession is not well developed they do not use their names. Watts and Zimmerman (1986) present an example of this: when Price, Waterhouse and Company, first operated in the US in the early days of the auditing profession there, they did not work under that name. This example of the US is still the case of many developing countries nowadays[163].

A good example for the role large auditors play in lobbying for international accounting standards is a statement by Ian Wright (Global Corporate Reporting Group Leader, PwC) and Jochen Pape (Chair PwC Global IAS Board, PwC):

"PricewaterhouseCoopers supports strongly the goal of a single set of global accounting standards. This could be achieved by the global adoption of International

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[162] As they were for at the time of most these studies

[163] For example, in Libya, some of the Big -5 still work jointly with Libyan auditors.

Accounting Standards (IAS) or by convergence between national standards and IAS. The adoption of IAS by the European Union creates the opportunity to achieve that goal and we hope that this survey will alert those involved in the process to the need for urgent action." (PricewaterhouseCoopers, 2002b, p.3)

Furthermore, the researcher sees that companies switching to a sophisticated set of accounting standards such as IAS or US GAAP will probably need high quality advice and maybe technical assistance (transition stage), which will be easily available from large accounting firms such as the big 5. Even during the years after the adoption of IRAS, the regular issuing of new standards will cause companies problems in applying them. Therefore, adoption of IRAS is more probable for companies which contract with big auditing firms, which are more likely to be highly efficient in providing such services. Dumontier and Raffournier (1998, p225) support this view by referring to the "superior international training" of the employees of such firms and to the competitive advantage of controlling the application of IAS caused by "existence of economics of scale in the development of competence in international accounting standards". Although the authors do not provide an explanation for this statement, the researcher's argument above about post adoption problems may give a plausible interpretation. The authors use another argument by Watts and Zimmerman (1986), which is the positive relationship between auditor firms' reputation and independence from their client. They suggest that large auditor firms may strengthen and enhance their reputation as independent auditors by encouraging their clients to adopt a stringent set of accounting standards.

Finally, Leuz (2003, p.451), indicate that an amendment of the German Commercial Code in 1998 has considerably increased the legal liability of the auditors with regard to the enforcement of 'IRAS'. He also reports that according to (§§331 and 332 HGB), auditors and directors could face criminal prosecution for misleading and fraudulent financial statements[164].

Empirical results of previous studies seem to be supportive. In the study by Hossain et al (1994), results from the univariate analysis find a significant relationship, while the multivariate test shows no significant relationship between voluntary disclosures and auditor identity. However, Hossain et al (1995) do not find any significant relationship. Craswell (1992) on the other hand, showed that auditor type is a

[164] There is no further explanation provided by Leuz to clarify this point.

significant explanatory variable influencing the extent of discretionary disclosure of reserves by oil and gas companies. Finally, in the results of Dumontier and Raffournier (1998), the univariate analysis showed a significant relationship between compliance with IAS and being audited by one of the big-6, whereas the multivariate analysis showed an insignificant relationship. Consequently the hypothesis here is:

$H6_0$: Ceteris paribus, the tendency of German companies to voluntarily adopt IRAS is either not associated with being audited by a Big-5 firm or negatively related with that.

$H6_1$: Ceteris paribus, the tendency of German companies to voluntarily adopt IRAS is positively associated with being audited by a Big-5 firm.

Proxies for auditing level variable:

Alongside the big 5, there are three big auditing firms which operate in the German audit market: Bayerishce Treuhandgesellschaft AG, BDO Deutsche Waren-treuhand AG and Grant Thornton. Still, as explained in Chapter 3, the concentration in this market is quite high in favour of KPMG and PwC. Street and Gray (2002) chose the measure the effect of the big-5 plus BDO and Grant Thornton. However, for the purpose of this study, the researcher has chosen to use the big 5 as a proxy for high quality auditing. The reason for this is that it is empirically proved by previous studies that the big 5 are high quality providers. Furthermore, there is no empirical evidence, to the researcher's knowledge, which may help to distinguish more high quality auditors from the rest of the other firms in the German auditing. Finally, it is also assumed that firms other than Big-5 are less international. A dummy variable will be used to code the big-5/non big five firms (see Chapter 6).

5.3.7 Listing Status

Like firm size, listing status is a factor which is commonly chosen as an independent variable affecting the extent of financial disclosure[165]. Listing status is considered by several researchers as a determinant of firms` behaviour. It has been studied on different levels. Whether companies are listed only on one domestic stock market, listed on more than one domestic stock market or listed on both domestic markets and foreign markets. In this research, attention is given just to whether companies

[165] However, it is less frequently used

are listed abroad, because it would appear that cross-listing in a single country is not an influential factor in the process of adopting IRAS. All companies in the sample are mainly listed on the FWB. but the vast majority are also listed on at least one more German stock market (see Chapter 2).

Gray et al (1995a, p43-44) suggest some major reasons for listing on foreign markets: the need to access additional capital, the desire to improve the marketability of a company's shares by broadening the shareholder base, the perceived benefits of an enhanced firm image in international markets and as a general reason to lower the cost of capital. Furthermore, Cooke (1989) states that multiple listed companies are often interested in foreign exchange since foreign operations are often financed by foreign capital (hedging reasons).

Leuz and Verrecchia (2000) hypothesise that multi-listed firms will decrease their cost of capital by compliance with an "international reporting regime" such as IAS or US GAAP. Furthermore, they argue that reporting under IRAS is most useful to foreign investors. In general, harmonised accounting practices through one set of accounting standards will give investors in the international stock markets a more adequate frame for better comparability on which their decisions will be based. The researcher argues that firms which look forward to an international listing will probably try to use an international language to communicate with investors cross borders. Whether it has been successful or not, IAS is intended to be this international accounting language. Gray et al (ibid) argue that in the context of capital market pressures a motivation for companies to voluntarily disclose more information is the desire to lower the firm's cost of capital. They explain that additional information reduces uncertainty about the firm. When a firm reduces its information risk, it expects investors to accept a lower rate of return and subsequently reduces the cost of capital.

The accounting and disclosure requirements of foreign capital markets can be a barrier to international listing. One famous example of this is the SEC requirements for firms seeking listing on the New York Stock Exchange (NYSE) or other US markets. All foreign firms listed on the NYSE are required to prepare their accounts under US GAAP or at least to reconcile them to US GAAP[166]. The Neuer Markt in

[166] www.nyse.com press

Germany, in turn, required all companies, including German ones, to prepare their financial statements either under US GAAP or IAS. Conversely, the London Stock Exchange (LSE) accepts the use of IAS or the GAAP adopted in member states of the European Union (mutual recognition). This may sound like an advantage for companies which seek listing on the LSE, but it is against the interest of the investors, who need comparable financial statements (arguably, it is still in the interest of LSE, which aims to get more listed firms).

Gray et al (1995a, p43) expect that internationally listed companies face more pressures than those listed only at home. Subsequently, "these pressures may result in relatively more and more harmonised voluntary disclosure in the annual reports of internationally listed companies". Drawing on Choi and Mueller (1984), Cooke (1989) states that companies seeking multiple listing to finance international operations need increased disclosure to adapt to local customs to meet the requirements of banks and other suppliers of capital. Furthermore, Cooke argues for the quotation status hypothesis using the agency costs notion. His point of view is that agency costs may vary according to quotation status. He argues that multi-listed companies have higher agency costs than those which are solely listed on domestic markets, because they probably have a larger number of shareholders and more dispersed shares (monitoring problems) (see size hypothesis). Moreover, Cooke also states that multiple listed firms are much more visible to the public than other firms; therefore pressures are placed upon them by investors, their agents, and other users for adequate levels of disclosure.

The researcher would argue that international investors may not trust the quality of accounts produced under German GAAP. The reason for this is that the quality of German GAAP and its value relevance is questionable (see Bartov et al, 2002). The example of Daimler Benz and how its earnings turned into losses after the reconciliation to US GAAP in 1993 may be a good example that supports the argument (see Chapter 4). Furthermore, it can be argued that German accounting is well known for being essentially based on the principle of creditor protection[167] which has resulted in excessive prudence. This characteristic of German accounting may affect its ability to compete in international markets such as LSE or NYSE

[167] See the part of my study which discusses the main features of German accounting

where local companies use accounting standards aimed at providing shareholders' information.

In Germany, not many companies have their shares listed abroad. Most of the German internationally listed firms are included in DAX. Whereas the most popular stock exchanges for their listings are the Swiss Exchange (SWX), Paris and NYSE (see Chapter 7). The small proportion of internationally listed companies may raise a question about the validity of this hypothesis. However, statistical tests should be run to show whether German companies are more likely to comply with IRAS once they turn to international capital markets.

Results of previous work: Most of the studies, which tested the effectiveness of listing status as a determinant of certain firm behaviours, support this hypothesis. Gray et al (1995) conclude that participation in international stock markets is significantly associated with additional voluntary disclosures in annual reports by multinationals. Studies by Hossain et al (1994; 1995) support the notion that listing status is statistically related to the levels of voluntary disclosure. Cooke (1989) indicates that quotation status is the most significant variable in explaining the variability in voluntary disclosure in Swedish companies. Furthermore, in his study about Japanese firms (1991), Cooke concludes that multi-listed firms disclose more information in their Japanese annual reports than firms listed only on the Tokyo Stock Exchange. In Germany, Leuz (2004) finds a significant positive relationship between listing abroad and segment reporting as well as the disclosure of cash flow statements.

With regard to studies considering compliance with IRAS, Dumontier and Raffournier (1998) find that listing status is an important explanatory variable for Swiss firms' voluntary compliance with IAS.

Based upon the arguments provided above the researcher would provide his hypothesis in the following form:

$H7_0$: Ceteris paribus, the tendency of German listed firms to adopt IRAS is either not associated with listing abroad or negatively related with it.

$H7_1$: Ceteris paribus, the tendency of German listed firms is positively associated with listing abroad.

Proxy for testing listing status: what is commonly used to proxy for the listing status are dummy variables which take the form of 1 or 0. In such case an internationally listed firm will be given 1, whereas 0 will be given to the ones whose listing is confined to German stock markets.

5.3.8 Hypothesis - Foreign investors:

It may be argued that the impact of foreign investors should be studied under the section of listing status. Foreign investors, however, can have impact on firms even if they are not listed on foreign exchanges. In the Main market companies tested in the current research, for example, there are 83 firms that have significant foreign investors, but only 7 of these firms are multi-listed. This makes it clear that the presence of foreign investors and their potential effect on accounting choices should be studied separately from the hypothesis on listing abroad. The main difference between this hypothesis and the one on listing abroad is that it is concerned with existing international investors rather than prospective investors (the concern of listing abroad).

In short, it was argued earlier that German GAAP is highly influenced by creditor protection and the preservation of capital, which clearly conflicts with an investor orientation. This of course limits the usefulness of GGAAP information for foreign investors who are, in particular, seeking useful information rather than creditor protection. This is sought in the provision of fair disclosure and transparency (see Chapter 3 for the characteristics of GGAAP; Chapter 4 for comparison with IAS and US GAAP).

Leuz and Verrecchia (2000. p.6) indicate that foreign investors need to be given special attention with respect to firms' financial reporting:

"German managers have had difficulty "explaining" their (German GAAP) financial results to foreign investors and have claimed that a lack of international acceptance of German financial statements has led to disadvantages when raising capital".

The authors report that managers have changed their reporting and disclosure policies in response to this concern. Deutsche Bank's spokesman emphasises the influence of existing foreign investor by stating: "we are doing this [adopting IAS standards] to prevent investors from turning away from Deutsche Bank because they

think they are not getting enough information" (*WSJ*. 12/20/1995. p.10 as cited in LV (ibid, p.6)).

In fact, to the researcher's knowledge, neither disclosure studies nor studies of compliance with accounting standards have empirically tested the impact of this factor. However, Glaum and Mandler (1997) was an exception; it tested the hypothesis that the acceptance of Anglo-American standards by German executive managers is positively related to the proportion of capital held by foreign investors. The authors found that the effect on managers' acceptance of Anglo-American accounting was not statistically significant.

Kinnunen, Niskanen and Kasanen (2000) test the hypothesis that earnings reported under IAS are more useful to foreign investors than to local investors. The authors tested this hypothesis on the Helsinki Stock Exchange, where the market is structured into two segments: one is for shares restricted to domestic investors, while the other segment is for shares available to anyone. They ran separate regression models using earnings under IAS and Finnish GAAP. Their results indicate that local GAAP (Finish) earnings that are restated in accordance with IAS help to meet the information needs of foreign investors, but are of limited use to local investors.

Volts (2003) sees that the adoption of IRAS by German companies is a key demand of foreign institutional investors. He argues that the numerous options to recognise income, the use of hidden reserves, and lack of transparency prevent institutional investors from accurately measuring the value of a company, and also from making fair comparisons with other companies using IRAS.

Based on the arguments above, the following hypothesis is suggested:

$H8a_0$: Ceteris paribus, the tendency of German firms to voluntarily adopt IRAS is either not associated with the presence of foreign investors amongst its shareholders or negatively related with it.

$H8a_1$: Ceteris paribus, the tendency of German firms to voluntarily adopt IRAS is positively associated with the presence of foreign investors amongst its shareholders.

One may argue that preferences of foreign investors would not have any influence on the managerial decision unless they are represented on the management board or the supervisory board. In other words, the existence of foreign managers on one of these

two boards may be an indication of the potential influence (see Chapter 2 for explanation on German corporate governance). Therefore, the following hypothesis is proposed to test this:

$H8b_0$: Ceteris paribus, the tendency of German firms to voluntarily adopt IRAS is either not associated with the presence of foreign members of the executive and supervisory boards or negatively related with it.

$H8b_1$: Ceteris paribus, the tendency of German firms to voluntarily adopt IRAS is positively associated with the presence of foreign members of the executive and supervisory boards

Both hypotheses in this section are statistically tested using binary variable (see Chapter 6 for details)

5.3.8.1 Internationality (internationality of business)

Most large corporations in the modern economy operate and have activities in countries other than their original country. These activities can be in the form of sales, manufacturing or services. Multinational corporations have been a subject of several studies. However, many of them avoid defining the term "multinational". The reason for this may be that researchers assume that the definition is clear to their readers. The researcher believes that this is not true and that defining this term is necessary to support the full understanding of these studies. It can be difficult sometimes in such studies to separate discussions about multinationals from those about internationally listed companies (for such studies see Gray et al, 1995a; Saudagaran and Meek, 1997). The similarity between the two issues comes as a result of the fact that both types of companies are linked with foreign environments. The difference in this environment is the groups which are interested in the financial statements of these companies. While the internationally listed companies focus mainly on investors in foreign markets and regulators of these markets such as the SEC in the US, multinationals will have to deal with a greater variety of interested groups such as governments, suppliers and labour unions. However, it should be indicated here that a firm can be classified as both internationally listed and a multinational. The International Labour Organisation in its preamble for Tripartite Declaration of Principles concerning Multinational Enterprises and Social Policy presents a definition for MNCs (International Labour Organization, 2001, p. 2):

"Multinational enterprises include enterprises. whether they are of public. mixed or private ownership, which own or control production. distribution. services or other facilities outside the country in which they are based".

The importance of this definition in this part of research is to separate what are known as multinationals and what are known as internationally listed companies[168]. The factor of listing status discussed above as a determinant of companies' behaviour is concerned with the latter (internationally listed firms). On other hand, the former "multinationals" is the focus of this hypothesis.

This characteristic is believed to have an important influence on these firms' behaviour. Cuijpers et al (2002, p7) explain that "companies operating internationally have a much more heterogeneous group of stakeholders than companies that mainly operate nationally". The authors argue that multinationals are more likely to adopt "non-local GAAP" in order to provide standardised information for these diverse stakeholders. Moreover they suggest that the listing status hypothesis focuses only on international shareholders and largely ignores the other stakeholders such as governments, customers and suppliers. The hypothesis of Cuijpers et al was that the probability of adopting non-local GAAP by is positively associated with the extent of this company's international operations. Dumontier and Raffournier (1998), on the other hand, argue that firms which operate internationally are more visible on foreign markets. In these foreign markets, customers, suppliers and governments are interested in the financial statements of these companies. Hence, managers of these multinational companies may adopt IAS to make their financial reports more readable and understandable in an international context. Raffournier (1995) also argues that when these users (stakeholders) examine the financial statements, they are more likely to refer to the practices of domestic firms. Thus he suggests that foreign companies are tempted to comply with the standard rules of the countries in which they operate (although he presents this argument under the hypothesis on listing status).

Further a recent study by Street and Gray (2002, p56) argues that "multi-national companies seeking access to international stock markets may be subject to several

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[168] The researcher will use the term 'multiple listed' for firms which are listed cross borders. However, this term may mean also firms which are listed on more than one German exchange. As explained above, the international perspective is the one considered in this research.

regulatory authorities and reviews". The authors state that this may put managers and independent auditors under pressure to focus more on the completeness and accuracy of the annual accounts. Moreover, they indicate that multi-nationals may be more likely to compete for raising capital with companies which adopt detailed accounting regulations such as US GAAP or UK GAAP. The last argument is an example of the mixing up of discussions on multinationality and listing abroad. It seems difficult sometimes to argue for the hypothesis of listing status separately from the hypothesis of internationality. Although Street and Gray study the determinants affecting the extent of compliance with IAS, their arguments may support the researcher's argument that pressure from these markets will drive multinational German companies to adopt IRAS.

Apart from the studies dealing with compliance with IAS, there are several ones which discuss the relationship between accounting practices and internationality. Saudagaran and Meek (1997) suggest that voluntary disclosures can be used by MNCs as a way to cope with international diversity in accounting standards. Like Gray et al's work, Saudagaran and Meek's paper does not make a clear distinction between multinational and internationally listed companies. Finally Saudagaran and Meek (ibid) refer to a finding by Zarzeski (1996) that companies in systems with high cultural secrecy increase their levels of disclosure as they grow larger and increasingly multinational and as they increase their sourcing of finance from stockholders (this is against the argument on leverage). This last observation might be related to Germany in which the accounting system is traditionally associated with high secrecy (see Chapter 3).

In addition to the arguments above, the researcher would introduce some other arguments to support this hypothesis. Multinationals have to deal with certain accounting issues which need well developed and stringent regulations. In Germany, for example, "foreign currency translation is not regulated" (Ordelheide and KPMG, 2001, p 1397). This example explains the need to employ recognised and accepted accounting standards to solve such issues. Furthermore, one may argue that in some countries, political pressures may be put on foreign companies' branches and subsidiaries. Some governments may have doubts about the activities of these companies. Moreover, they will be cautious with any financial information provided by these foreign companies for tax purposes. It is possible then that they choose to

report under IRAS in order to increase their credibility and to enhance their image. Finally, for hedging reasons companies may tend to raise finance from local banks in the countries in which they have subsidiaries. Adoption of IRAS can be a useful step (credibility and enhanced image) in getting financed from by these banks.

Results on the relationship between the extent of business abroad and accounting practices is somewhat inconsistent. Cuijpers et al (2002) conclude that the likelihood of using non-local GAAP increases with the geographic spread of firms' businesses. Street and Gray (2002) indicate in their results that there is not any significant relationship between the extent of compliance with IAS and foreign business. Leuz (2004) presents the results of applying two models which include foreign business as a determinant variable in cash flow and segment reporting disclosures. The first result is that foreign business factor is "unexpectedly insignificant". The other result is more confusing as he finds a significant negative coefficient. Leuz (ibid) describes his results about foreign business as puzzling and inconsistent with his expectations. Still, Dumontier and Raffournier (1998) indicate that both univariate and multivariate analyses show a positive influence of internationality on voluntary compliance with IAS by Swiss companies.

Based on the arguments stated above, the researcher suggests the following hypothesis:

$H9_0$: Ceteris paribus: the tendency of German firms to voluntarily adopt IRAS is either not associated with the foreign business of a firm or negatively related with that.

$H9_1$: Ceteris paribus: the tendency of German firms to voluntarily adopt IRAS is positively associated with the foreign business of a firm.

Proxies for internationality: variables suggested to proxy for nationality are different and reflect various concepts of internationality. Dumontier and Raffournier choose the proportion of foreign sales. Whereas Cuijpers et al (2002) choose the number of geographic segments reported by a firm. Leuz (2004) use the percentage of revenues generated outside Germany. Finally, Street and Gray use the percentage of foreign sales (foreign sales divided by total sales). One may argue that the number of foreign subsidiaries can be employed as a proxy for internationality. This proxy may reflect the extent to which a firm is involved in foreign countries. For the

purpose of this study, the researcher suggests both proxies: the percentage of sales abroad and whether the company has a subsidiary or subsidiaries abroad or not. Whereas the first proxy is clearly a continuous variable. the second proxy is a binary variable (see Chapter 6).

One may think of a possible relationship between internationality of business that of listing status. The very small number (relatively) of multiple listed firms compared with that of firms having subsidiaries abroad does not support this idea (more is Chapter 8)

5.3.9 Industry (line of business):

In many aspects it seems that industry for a company can be like a family for a person. It is important to indicate this close relationship between a firm and its industry as this will help explain the effect which industry can have on the firm. The limits or boundaries of an industry are not easy to draw. These boundaries are determined by several factors such as competition and regulation.

Accounting regulations and standards can be sometimes tailored for specific industries. Banks and financial institutions, for example, are usually regulated by a different set of accounting rules and standards. Companies operating in the oil and gas sector for example, have different accounting issues which, in some cases, need a separate set of rules or standards. In fact, many industries have certain accounting problems of their very own, which need special attention on the part of standards setters.

A Research by KPMG and Goldman Sachs in 2002 identifies specific areas that are influenced by the change IAS and expected be significant for particular sectors. For instance, they state that development costs and environmental provisions and major repairs are important for the Chemicals and Pharmaceuticals sector. whereas revenue recognition and intangibles are important to the Media and Telecom sectors. This clearly supports the argument that the voluntary compliance with IAS (or US GAAP[169]) can be influenced by how negative/ positive the impact of the switch to IRAS on these specific areas would be.

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[169] Because these are also areas which can be clearly influenced by the adoption of US GAAP

Disclosure studies give some attention to the industry hypothesis. As reported by Naser and Wallace (1995), firms in Hong Kong may provide additional disclosures corresponding to the nature of their industry (that is in addition to the minimum disclosure requirements). They also expect that companies in the property sector will have less information to disclose than those in other sectors. Yet, this cannot be considered as a non-disclosure policy related to competition factors for example. Inchausti (1997) uses signalling theory to suggest that if a company does not implement the same disclosure policies adopted by other companies within the same industry, the market may view this as "bad news". On the other hand, Cooke (1989) argues that disclosures by a lead company in a certain industry may encourage other companies in the same industry to adopt the same disclosure policies. However, in the researcher's view this may conflict with the concept of proprietary costs, which suggests that more disclosure by some firms, especially small ones, can put them at a competitive disadvantage as compared to firms within the same industry (see size hypothesis). Naser and Wallace (ibid) present the industry hypothesis in a different way from other researchers. Their hypothesis is that non-conglomerate firms provide less disclosure than ones classified as conglomerate. They explain that conglomerate companies have a larger scope of operations than firms in other industries. However, their hypothesis does not seem to be worth testing because having more or less information to disclose does not reflect your policy towards voluntary disclosure. In other words, having little information to disclose because of the nature of the business does not necessarily mean that the company wants to disclose less. Hence, this limited disclosure is not the result of a managerial decision to increase disclosure or not.

Watts and Zimmerman (1986) indicate that some auditing firms specialise in certain industries. Thus, it is probable that IRAS could be suggested by auditors to their clients in specific industries. Similarly, the researcher argues that local GAAP may not be sophisticated enough to deal with accounting issues peculiar to certain industries. This will be an incentive to the companies to seek accounting standards which satisfy their special needs in financial reporting. Cuijpers et al (2002) support this notion as they report that firms in some industries may prefer to use IRAS because of certain provisions they do not find in local regulations. In fact the proprietary costs argument also can be employed to support this hypothesis. In

industries with high proprietary costs, the researcher would expect that companies will be reluctant to comply with IRAS because of potential competitive disadvantage. On the other hand, in other industries with lower proprietary costs, compliance with IRAS may be more likely. As explained above in the size hypothesis, a considerable size gap exists in some industries in Germany. This may validate the argument of proprietary costs, so that the researcher will expect in such an industry a low propensity to comply with IRAS.

As in most the previous hypotheses, results of previous studies are inconclusive. Leuz (2004) concludes that voluntary segment disclosure is higher in industries with low proprietary costs [170]. Harris (1998) and Shin (2002) find evidence of a relationship between market competition and voluntary disclosure. Cuijpers et al (2002), on the other hand, do not find a significant difference in the tendency to adopt non-local GAAP across manufacturing and non manufacturing industries. Finally, Street and Gray (2002) find a significant impact of industry type on the extent of compliance with IAS.

The researcher suggests that industry type has an impact on the decision by German companies to adopt IRAS. Thus, the industry hypothesis is suggested in the following form:

$H10_0$: Ceteris paribus, the tendency of German firms to voluntarily adopt IRAS is not related to the industry to which they belong.

$H10_1$: Ceteris paribus, the tendency of German firms to voluntarily adopt IRAS is related to the industry to which they belong.

Proxies for industry: In modern economies companies tend to be conglomerate and it is difficult to decide which industry they belong to. For instance, many companies nowadays are engaged in both manufacturing and services to the extent that a researcher will be confused whether to classify a company as a manufacturer of a service provider. Street and Gray (2002), for example, divided industries into five groups with five dummy variables: Manufacturing1, Manufacturing2, Transportation and Commerce, Wholesale, Services and Other. Cuijpers et al (2002) divided them into: manufacturing and non-manufacturing. On the other hand, Cook (1989)

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[170] At the sample period (1999), the German firms were not required to provide complete segment reporting.

classified industries into four divisions: manufacturing, trading, services and conglomerate. Cook gives these four divisions the dummy 0 and one variable. For German companies, Leuz (2004) used the sectors provided by Deutsche Börse based on the Composite DAX industry classification. Apart from the conglomerate issue, to classify firms adequately, the researcher would need to obtain a description for each firm's activity. Because this would not be cost-effective, the researcher prefers to use the classification made Deutsche Börse, which is also used by Leuz (2004)[171]. As explained in Chapter 6, dummy variables (0/1) will be used for each industry category.

5.4 Hypotheses on the choice of IAS or US GAAP both in the Main market and the Neuer Markt:

Whereas in the Main market the choice of accounting standards can be G GAAP, IAS or US GAAP, the choice in the Neuer Markt can only be IAS or US GAAP. This section discusses the hypotheses on the choice of IAS or US GAAP, which takes place both in the Neuer Markt and the Main market. As shown in Chapter 6, only 23 Main market firms used US GAAP for the year 2001. This is a relatively small number compared with 67 firms used IAS, and more than 205 firms used GGAAP. However, the number of firms using US GAAP in 2001 in the Neuer Markt is not much smaller than the number of those using IAS (134, 110 respectively). Leuz (2003, p.465) states, in a footnote, that: "It is interesting that the split between IAS and U.S. GAAP has been roughly half and half throughout the history of the New Market."

To the researcher's knowledge, only Leuz (2003) and Tarca (2004) examine the choice of IAS or US GAAP[172], and very lately Weißenberger et al (2004).

The main aim of Leuz (ibid) is to examine whether there are significant differences in bid-ask spread and share turnover (as proxies for information asymmetry) between firms reporting under US GAAP and those using IAS (see Chapter 4). Still, in a further section, Leuz analyzes the firms' accounting standards choices in the Neuer Markt. Leuz argues that examining firms' choices provides additional evidence on the quality of the two sets of standards. This argument is based on the fact that two

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[171] Sectors in Deutsche Börse are nine. However, the ones used by Leuz are five. The researcher expects to reduce the number as well according to data availability.

[172] To some extent, this can be supported by the fact that these two studies do not refer to any other studies with a similar scope.

GAAPs compete in the Neuer Markt implying that "firms trade off the costs and benefits of choosing IAS and US GAAP" (p. 465). The hypotheses suggested by Leuz to explain the standards choice are based on the assumption that US GAAP is of higher quality than IAS. Based on this assumption, Leuz likens the choice of US GAAP to the choice of voluntary disclosure of higher quality information, and hence he borrows from the literature on voluntary disclosure to state his hypotheses on the use of US GAAP. This is clearly the same idea used in the hypotheses about choosing IRAS in the current research. Leuz (ibid) hypothesises that firm size, current and future financing needs and firm performance are determinants of compliance with US GAAP, simply because they are determinants of voluntary disclosure. However, he does not give any explanation of the logic of these hypotheses or the reason for choosing them in particular.

Ashbaugh (2001) also indicates that US GAAP has more stringent disclosure requirements than IAS and that companies complying with US GAAP provide more standardized information. Still, this comparison is based on information from the mid-nineties (1993-1996). Substantial changes in IAS during late nineties may make this assumption questionable. Furthermore, the author states that US GAAP is perceived as being "too restrictive in its accounting method choice and/or too demanding in its disclosure requirements" (p.145). Ashbaugh also argues that compliance with US GAAP implies additional costs which may not be incurred when using IAS. However, she indicates that the evidence for this last argument is "anecdotal" (p.146). Furthermore, she does not test any hypotheses on the choice of IAS or US GAAP, as she treats them as one choice versus the choice of domestic GAAPs of the sample firms (see Table 5.1).

Tarca (ibid) examine the choice of accounting standards through a sample of companies from the UK, Germany, France, Japan and Australia. The author investigates different levels of choices. First, she examines the choice between national standards and IRAS. Second, she studies the choice of adoption (use of IRAS instead of local GAAP) or supplementary use. Finally, she examines the choice of IAS or US GAAP within three groups of firms: all firms use IRAS (in the form of adoption or supplementary use), only firms adopting IRAS, only firms using IRAS in a supplementary form. According to Tarca (ibid), adopters are firms that declare in the accounting police note or audit report that they comply with US GAAP

or IAS instead of their domestic GAAP. Supplementary use, on the other hand, includes: firms that use one or more policy of IRAS: firms which provide a reconciliation statement to IRAS: and firms that provide an additional set of financial statements in accordance with IRAS. Tarca suggests that the institutional framework is the main factor in the choice of the accounting standards at the first two levels (national/international and adoption/supplementary). Furthermore, she suggests that size, foreign revenue, leverage and industry can also be determining factors on these choices. Although the author explains her hypothesis about the institutional framework, she does not explain the rest of hypotheses (still, she refers to the literature of disclosure).

At the level of choosing IAS or US GAAP, Tarca provides only two hypotheses which are: First, firms listed in the US (NYSE or OTC) are more likely to adopt US GAAP. Second, firms which are listed on non-US foreign exchanges are more likely to use IAS. However, the author still tests for the variables: size, foreign revenue, country of domicile, leverage and industry. Unlike Leuz (ibid), the author does provide any justification for testing these variables and does not even hypothesise any direction for the relationship between these variables and the choice of IAS or US GAAP.

Weißenberger et al (ibid) have a different approach in testing the choice between IAS and USGAAP, and hence the majority of the factors they test are different from the other studies. They survey companies through seventeen statements (questions) that are related in different ways to choice of accounting standards. However, it should be pointed out here that many of the statements of this survey are not clear at all and there are no explanations for them, therefore the researcher is unable to discuss them here (see Table 5.1). Still, only six of the factors studies were associated with the choice of IAS or USGAAP. As concluded by the authors (p.14), German companies using IFRS support the following views: the idea that it is more similar to GGAAP than USGAAP, more common and accepted in Europe and it offers more opportunities to influence the process of standard setting. On the other hand, companies using US GAAP believed that it would be more beneficial in the US market and of more global importance than IAS. Moreover, they do not expect that the SEC would accept IAS in the near future.

In 2000 KPMG conducted a survey involving Chief Financial Officers from 17 European countries[173] to investigate their views on several issues relating to IAS and US GAAP. Respondents to this survey belonged to three groups of firms: domestic GAAP users, IAS users and US GAAP users. These three groups of respondents rated the quality of IAS and US GAAP differently. Overall, while 49 % of respondent rated IAS as being "high quality", 54 % of respondents rated US GAAP as being "high quality". The survey indicates that, in general, respondents have a perception that there is small difference in the quality of the two sets. Furthermore. CFOs also believe that US GAAP is complex and too detailed compared with IAS. At the same time, the respondents generally think that specific accounting differences between the two sets are not significant enough to influence the choice of GAAP.

Yet, KPMG (2000, p.15), indicate that "the main factor in favour of IAS is the cost of implementation". According to their results, 70% of domestic GAAP users[174] think that IAS would be cheaper to implement. Based on this argument, it is possible to apply the hypotheses proposed for the Main Market to the Neuer Markt.

On the other hand, the respondents believe that the most influential factor in choosing between IAS and US GAAP is the potential for increasing the availability of capital and that US GAAP provides better opportunities in this regard. This can be explained by the large capacity of the US capital market and the insistence by the SEC on the use of US GAAP.

Tarca's results (ibid) support this notion, as listing on NYSE is the only significant factor in choosing US GAAP rather than IAS across her three models[175]. Leuz (2003) does not test the hypothesis of US listing. Although he does not state the reason for this, it can be understood that was not possible simply because his sample is taken from the Neuer Markt. Only four firms on the Neuer Markt are also listed in the US, three of which were on NASDAQ (as at the end of 2001). Still his results show that the only significant factor in choosing between IAS and US GAAP is the financing needs of the firm (whose proxy is sales growth). Leuz explains that this is consistent with the results of KMPG (2000) that firms with large finance needs are more likely

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[173] Countries in this survey are the EU member states (at that time) plus Switzerland and Norway.
[174] Those are assumed to be not biased towards either IAS or US GAAP (KPMG, ibid)
[175] Table 5.1 shows that size and country of domicile were marginally significant, but this result is not consistent across the three models.

to seek listing in the US, and hence are more likely to comply with US GAAP. Furthermore, results show that free float is negatively associated (but marginally significant) with the adoption of US GAAP. Leuz explains this by stating that firms which are intending to list in the US are more likely to keep hold of a larger proportion of the firm's capital.[176] (see above). Furthermore, Leuz also reports the results of a survey by Peemöller, Finsterer, and Neubert (1999), who investigated the views of 26 firms in the Neuer Markt. Their responses suggest that existing and intended US listings are significant factors in choosing to adopt US GAAP.

As noted above, the literature on the choice between IAS and US GAAP is limited. This makes it difficult to postulate hypotheses on these specific firms' behaviour. However, the following section presents two groups of hypotheses: hypotheses based on the existence of direct US influence (US listing, US subsidiaries and US investors) and hypotheses that are based on the idea that US GAAP is much more detailed and costly than IAS.

Overall, it should be remembered that for all the hypotheses suggested on the choice between IAS and US GAAP, the likelihood of adopting US GAAP is increased in the case of the Neuer Markt firms, because the incremental cost of implementing US GAAP is smaller for them (difference between cost of US GAAP and that of IAS, which is the alternative set)[177].

5.4.1 Hypothesis on US listing:

As explained above the most significant factor thought to influence the choice of US GAAP is listing in US markets. At the end of 2001[178], 15 German firms were listed on the NYSE, of which only one belonged to the Neuer Markt (Pfeiffer AG)[179]. This may be explained by the fact that the vast majority of the Neuer Markt firms are relatively small or of medium-size[180]. On the other hand, only 5 German firms were listed on NASDAQ. Hence, it is not possible to test this hypothesis for the Neuer

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[176] Although Leuz do not explain his hypothesis or choices of proxies, it seems that he is assuming that companies with large financing needs (sales growth) are likely to be planning to list in the US.
[177] In other words, the difference between the cost of implementing US GAAP and IAS, is probably smaller that that between the cost of implementing US GAAP and G GAAP.
[178] 17 at the end of 2003
[179] Although it is medium-sized firm, it is a market leader in its business. USA is one of its important markets. Furthermore, it had been listed on NYSE even before it was listed on the Neuer Markt (Kaen and Sherman, 1999)
[180] The list of firms listed on NYSE clearly indicates that size is an important determinant in choosing to list shares on NYSE.

Markt, because of these small frequencies. However, it can be tested for the Main Market, where the number of firms listed on the US is much larger.

Based on the arguments above the following hypothesis is suggested: (Like in the Main Market section, hypotheses are stated in both alternative and null form)

$H11_0$: Ceteris paribus, the tendency of German firms to voluntarily adopt US GAAP is either not associated with being listed in the US or negatively related with it.

$H11_1$: Ceteris paribus, the tendency of German firms to voluntarily adopt US GAAP is positively associated with being listed in the US.

5.4.2 Hypothesis on US subsidiaries:

In general, many of the arguments stated above in the hypothesis on internationality can be applied here. It is common knowledge that the large capacity of US product market attracts companies from across the world. German companies have a big interest in this market. In a visit to the US, the German Chancellor Gerhard Schröder states: "I don't think there's another European economy that is as interwoven with America as Germany's," Furthermore he adds "More than 800,000 jobs exist with German subsidiaries (in the U.S.) and, conversely, 500,000 jobs in (American subsidiaries) in Germany. That shows the relationship." (Deutsche Welle, 2003)

This statement by the German Chancellor indicates the significance of German subsidiaries in the US.

Considering the significant differences between G GAAP and US GAAP, German companies that have subsidiaries in the USA may need to provide more understandable and comparable financial statements to their US users[181], who would normally prefer to deal with a familiar reporting system. One can argue that the US market is significant enough to be a strong incentive for interested firms to adopt US standards. It can be also argued that the incentive can be stronger for companies from the Neuer Markt (as argued above about the incremental cost of applying US GAAP for Neuer Markt companies).

Another related argument is that many firms believe that listing in the US is a means of accessing the US market or to finance their operations there (see the hypothesis on

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[181] These users include different interested parties such as government, suppliers and banks.

"internationality" above). Furthermore. Kaen and Sherman (1999. p.128) suggest that visibility of the company in a country's financial markets may enhance the visibility of its image, brands and products in the product and labour market. Ulrich Hartmann, chairman of the board of management and CEO of VEBA, reports that: "Improving our access to the immense US market for products, services and capital is our most important reason for coming the New York Stock Exchange" (ibid. 1999, p. 151). From this last statement, it is clear the aim of accessing the product and service market may be linked with aim of accessing the capital market. Therefore, one can argue that German companies which already operate in the US market are very likely to be intending to list in the US capital market to finance their US operations and to enhance their image in that product labour market. One should also point out that the desire to enter the US debt market (for hedging reasons) can be also an important incentive.

$H12_0$: Ceteris paribus, the tendency of German firms to voluntarily adopt US GAAP is either not associated with having a subsidiary the US or negatively related with it.

$H12_1$: Ceteris paribus, the tendency of German firms to voluntarily adopt US GAAP is positively associated with having a subsidiary the US.

It is clear that the only type of variables that can be used to test this hypothesis is a binary variable (see Chapter 6)

5.4.3 Hypothesis on US investors:

This hypothesis is mainly based on the hypothesis on the existence of foreign investors stated above. Therefore, to be brief, one could say that to attract US investors, either through the German capital market or the US capital market, German firms would prefer to produce information that is more readable and comparable for US investors who are probably used to information produced under a very different information system. This can be easily read and understood in the hypothesis on US listing and foreign investors above. The case of Daimler-Benz, mentioned above and explained in Chapter 4, may be of particular importance for US investors, because it might have made Americans more cautious about G GAAP.

One can also argue that even if German firm were reluctant to list their shares in the US because of the costs of using US GAAP, the increasing percentage of German

shares held by institutional investors may put similar pressure on them to use US GAAP. Brändle and Noll (2004) reports that institutional investors are important external monitors in the US and UK, who are also becoming large block-holders in Germany. Their portion of all shares of German listed companies increased form 4% in 1990 to approximately 13% in 1998. The authors use the example of CalPERS. the California public employee pension fund, to illustrate the increasing role of US institutional investors in the development of German corporate governance towards the Anglo-Saxon model. The message of CalPERS is that companies wanting CalPERS to invest in them have to comply with specific standards with regard to corporate governance system. The Economist[182] (as cited in Economist.com, 2004) states that large American investment institutions such as CalPERS, Fidelity and TIAA-CREF are typical examples of the growing influential foreign shareholders.

Based on arguments presented above on the role that foreign institutional investors have had in the introduction of IRAS in Germany, one may argue that the US institutional investors such CalPERS would use their influence to recommend the adoption of US GAAP rather than IAS.

Based on this the following two hypotheses are suggested:

$H13_0$: Ceteris paribus, the tendency of German firms to voluntarily adopt US GAAP is either not associated with US shareholders or negatively related with it.

$H13_1$: Ceteris paribus, the tendency of German firms to voluntarily adopt US GAAP is positively associated with US shareholders.

In the section on the hypotheses of Main Market above, it was suggested that having foreign managers can be a proxy for the influence foreign investors can have. A similar can be applied here by suggesting that having US managers is a proxy for the influence of US investors.

$H14_0$: Ceteris paribus, the tendency of German firms to voluntarily adopt US GAAP is either not associated with the existence of US managers on the management board or the supervisory board or negatively related with it.

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[182] The Economist May 3rd 2001 print edition but as a secondary reference

$H14$: Ceteris paribus, the tendency of German firms to voluntarily adopt US GAAP is positively associated with the existence of US managers on the management board or the supervisory board.

These two hypotheses are tested using binary variables. Although the variable suggested to test the hypothesis $H13_0$ was intended to be a continuous variable (percentage of equity held by US investors), it is changed to a binary variable for a practical reason (see Chapters 6 and 7).

Additional hypotheses from the disclosure studies:

Apart from the hypotheses stated above for the choice between IAS and US GAAP, it is possible to adopt the idea suggested by Leuz (2003) that firms complying with US GAAP are committing themselves to increased levels of detailed disclosure and higher costs. It should be remembered that this is the same basic idea used to postulate the hypotheses for the main market by assuming that IRAS is of higher quality and involves more detailed disclosure than GGAAP.

Because these hypotheses are discussed above in detail, they are postulated here without any further explanation.

5.4.4 Size:

$H15_0$: Ceteris paribus, the tendency of German firms to voluntarily adopt US GAAP is either not associated with size or negatively associated with it.

$H15_1$: Ceteris paribus, the tendency of German firms to voluntarily adopt US GAAP is positively associated with size.

5.4.5 Ownership structure:

$H16_0$: Ceteris paribus, the tendency of German firms to voluntarily adopt US GAAP is either not associated with proportion of free float or negatively related with it.

$H16_1$: Ceteris paribus, the tendency of German firms to voluntarily adopt US GAAP is positively associated with the proportion of free float.

5.4.6 Auditor Type:

$H17_0$: Ceteris paribus, the tendency of German firms to voluntarily adopt US GAAP is either not associated with having a Big-5 auditor or negatively associated with it.

$H17_1$: Ceteris paribus, the tendency of German firms to voluntarily adopt US GAAP is positively associated with having a Big-5 auditor.

5.4.7 Leverage:

$H18_0$: Ceteris paribus, the tendency of German firms to voluntarily adopt US GAAP is either not associated with leverage or positively associated with it.

$H18_1$: Ceteris paribus, the tendency of German firms to voluntarily adopt US GAAP is negatively associated with leverage.

5.4.8 Profitability:

$H19_0$: Ceteris paribus, the tendency of German firms to voluntarily adopt US GAAP is either not associated with profitability or negatively related with it.

$H19_1$: Ceteris paribus, the tendency of German firms to voluntarily adopt US GAAP is positively associated with profitability.

5.4.9 Industry:

$H20_0$: Ceteris paribus, the tendency of German firms to voluntarily adopt US GAAP is not associated with the industry to which a firm belongs.

$H20_1$: Ceteris paribus, the tendency of German firms to voluntarily adopt US GAAP is associated with the industry to which a firm belongs.

5.5 Summary:

The result of this chapter is two groups of hypotheses on the two main choices available in FWB: the choice between GGAAP and IRAS and the choice between IAS and US GAAP.

The group of hypotheses on the choice between GGAAP and IRAS can be summarised in one null form as the following: the tendency to comply with IRAS by German listed firms is either not associated with size, being in a quality segment, the

proportion of equity capital held by managers, the proportion of free float, leverage, profitability, auditor identity, listing status, internationality of business, internationality of investors and industry type or is negatively related to size, being in a quality segment, the proportion of free float, profitability, having a Big-5 auditor, listing abroad, having foreign subsidiaries, having foreign investors / or positively related with the proportion of equity capital owned managers and leverage.

For the choice between IAS and USGAAP, on the other hand, two main types of hypotheses are tested. The first type of hypotheses on the choice of USGAAP or IAS is based on the presence of a U.S. element. In short, these hypotheses can be summarised in the following null form: that the tendency to comply with USGAAP is either not associated with listing in the U.S., having U.S. investors, having U.S. subsidiaries and U.S. managers or negatively related to them. It should also be mentioned that analysis on the choice between IAS and USGAAP is run in two separate parts: Neuer Markt and Main Market.

The second type of hypotheses comprises those built on a basic assumption that US GAAP over IAS is more stringent and requires more disclosures than IAS. These hypotheses are, in general, almost similar to the ones above tested on the choice between GGAAP and IRAS. They can also be summarised in one null hypotheses as the following: the tendency of German companies to choose USGAAP is either not associated with size, being in a quality segment, the proportion of equity capital held by managers, the proportion of free float, leverage, profitability, auditor identity, listing status, and industry type or is negatively related to size, being in a quality segment, the proportion of free float, profitability, having a Big-5 auditor / or positively related with the proportion of equity capital and leverage.

6 Chapter 6: Research design

6.1 Introduction:

This chapter is intended to be an introduction to the statistical analysis presented in Chapter 7 and Chapter 8. It provides explanations on the following main points: data resources, the study sample, the process of data collection and the statistical analysis. This last part aims to justify the use of the different statistical techniques and how suitable they are for the purpose of this research.

6.2 Data resources

The main data resource for this research is *Hoppenstedt Aktienführer*, which is to the researcher's knowledge is the most comprehensive database for German listed companies. Examples of leading researchers who have used *Hoppenstedt* are: Leuz, (2003) Franks and Mayer (2001). This database is described by the library of Michigan Business School as:-"...a directory of German companies gathered from data that the companies must submit to the German government. It is an excellent source (provided you can speak German) of information on specific companies in Germany"[183]. The researcher compared this database with other databases available (Datastream and Amadeus). The researcher found that for the purpose of this study, *Hoppenstedt* is the most suitable database. One advantage is that it provides data for most of the variables in this research in one place. Another advantage of *Hoppenstedt* to other databases is that it is consistent in the data it provides about different firms. In Amadeus for example, it is possible to find that some data, such as auditor name, is available for some firms, but not for others. For a sample of firms checked by the researcher, the auditor information was not available[184]. Furthermore, one cannot find in Amadeus information about the accounting standards used in the annual reports. Datastream, on the other hand, is commonly used in the financial literature for market data such as shares prices and returns rather than company accounts. Moreover, company accounts in Datastream do not include information about either accounting standards or auditors, which is essential for this research.

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[183] http:/ www.bus.umich.edu/KresgeLibrary/Collections/ByTopic/step4.htm

[184] If this piece of information is not available for a firm, Amadeus state that "There is no auditors' information available for this company". However, for a random sample of firms checked by the researcher it seemed that Amadeus do not disclose this information for any firm. The same note applies to exports

Data was also taken from annual reports of the chosen companies. These annual reports were either hard copies or soft copies. *Hoppenstedt* 2002 includes information about all firms whose shares were traded in Frankfurt and other German stock markets at the end of the year 2001. However, *Hoppenstedt* 2002 does not include the consolidated accounts for the financial year 2001 for most of these firms. Therefore, *Hoppenstedt* 2003 was used as the main source for this data. In addition to that, *Hoppenstedt* 2002 was used as the source for listing status and ownership structure. Furthermore, the number of firms in *Hoppenstedt* 2002 is different from that in *Hoppenstedt* 2003, simply because of changes in the listing status of some companies or mergers that have taken place during 2002[185]. The researcher started with firms in *Hoppenstedt* 2002. Therefore, data for firms included in *Hoppenstedt* 2002 and not *Hoppenstedt* 2003 was obtained from the annual reports of these companies.

6.3 Main Market

6.3.1 Study Sample:

As mentioned in Chapter (2), firms in the main market are the ones whose shares are traded in either the official or the regulated markets[186]. These firms are studied separately from the ones in the Neuer Markt. This separation came because firms in the Main Market have different GAAP choices from the ones in the Neuer Markt. Whereas in the Main Market the choice is IAS, US GAAP or German GAAP, the choice in the Neuer Markt is either IAS or US GAAP. Institutional differences between the two market is another reason to study them separately

Firms that are classified as "Freiverkehr"[187] are excluded from this study, which is confined to listed firms.

As shown Table 6.1, a series of exclusions was made in order to obtain a complete data set and in order to eliminate some companies whose inclusion would have been inappropriate. The number of firms in the Main market as in *Hoppenstedt* 2002 is 458[188]. The researcher has chosen to eliminate firms that are a subsidiary of another

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[185] Hoppenstedt provided this explanation via a personal email to the researcher.
[186] "Amtlicher Markt" and "Geregelter Markt"
[187] Unofficial regulated market which can be equivalent to "Over the Counter".
[188] This number is consistent with that produced by the World Federation of Exchanges (12-10-2002).

German listed firm[189] included in the sample. This elimination is simply to avoid any double counting, because the subsidiary's accounts will be included in the parent's consolidated accounts. This double counting may cause bias in the results (see Leuz 2004). The largest proportion of these firms (84%) is "unclassified"[190]. The second exclusion was made to eliminate firms that do not have consolidated accounts. This is simply because the only available choice for them is GGAAP. Among those excluded because they were subsidiaries there are 25 firms that do not produce consolidated accounts. This means that 25 firms are excluded for both reasons. Finally, financial firms (defined below) are also excluded because of the very nature of their accounts. The different way in which their accounts are presented in *Hoppenstedt* is not consistent with the accounts of the other sample firms. Therefore, the sample still includes some financial firms whose accounts are comparable to the accounts of firms in the rest of the sample (see Table 6.7). The majority of these firms are in the real estate business, whereas the rest are engaged in businesses related to the stock markets such as "Deutsch Börse". This means that the financial firms excluded are the banks and insurance firms. Among firms that are subsidiaries there 17 firms of a financial nature. This means that they were excluded for two reasons.

Table 6.1: Finding the Target Sample

Segment	Orig.No		Owned		No. Cons		Finan. S		Target sample		
		%		%		%		%		%	%[191]
DAX	30	100	3	10	-		5	16.7	22	73.3	6.7
MDAX	70	100	5	7.1	-		6	8.6	59	84.3	18
SMAX	106	100	2	1.9	3	7.5	9	8.5	92	86.8	28
Unclassified	252	100	53	21.0	37	14.7	7	2.8	155	61.5	47.3
Total	458	100	63		40		27		328		100

Produced by the researcher: Orig.No: original number, Owned: owned by another sample firm, No. Cons: don't consolidate, Finan. S: accounts of different nature

As a result of the exclusions mentioned above and shown in Table 6.1, the researcher ended with a target sample of 328 firms. This table also shows the percentage of each market segment included in the target sample.

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[189] The criterion was whether the stake held in the subsidiary's capital is greater than or equal to 50%
[190] Not classified in segments
[191] This column designed to read the percentages downwards (vertical)

Table 6.2, on the other hand, shows that consolidated accounts for years ended in 2001 were missing for a number of firms, despite numerous attempts by the researcher to obtain them. The reason that these firms do not have their consolidated accounts in *Hoppenstedt* or on the Internet is that most of them either have gone bankrupt or are having difficulties in producing their accounts[192].

Taking out the firms with missing accounts from the target sample, results in the sample for the main market, which represents 89.4% of the target sample. Such a high percentage may seem to be a good support for drawing inferences and conclusions. However, it is common knowledge that a large sample can be useless or may be misleading if all companies were not fairly represented. Therefore, it was necessary to look closely at these firms and how different they are from the sampled firms. It can be seen from the table 6.2 that the missing firms are unclassified firms. Data and information for the missing firms were collected from the annual reports available for previous years (ending in 2000 or 1999). According to this information, nothing seems to be unusual about these companies or different from the rest of unclassified firms. Furthermore, the vast majority of these firms seem to be GGAAP firms, which compromise 67 % of the whole sample and 86 % of the unclassified firms. The above can give assurance that the sample represents the listed companies to an acceptable extent[193]. Although one may argue that survivorship bias still exists in this data, this type of bias is commonly found in the accounting and finance studies. Still the sample in this study is larger than those in several well recognized studies in this area, such as Dumontier and Raffournier (1998), El-Gazzar et al (1999), Gray and Street (2002) and Ashbaugh (2001), who start their data collection with large target samples but end up with biased samples after series of eliminations for different reasons including missing data[194].

The data relates to just one financial year, but for a large number of companies representing a remarkably high proportion of all companies listed in both the Main Market and the Neuer Markt; it should be considered as a snapshot sample from a larger population which exists across time periods. Therefore, this also justifies the use of statistical inference techniques, which are discussed in Section 6.5.2.

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[192] This information is via a personal email from Hoppenstedt and emails from some of these firms.
[193] This issue has been discussed with a number of statisticians via email.
[194] Street and Gray (2002), for example, exclude companies only because they do not publish reports in English language.

Table 6.2: Missing Cases

Segment	Target sample	Missing cases		Sample studied	
DAX	22	-		22	100%
MDAX	59	-		59	100%
SMAX	92	-		92	100%
Unclassified	155	33	21.3%	122	78.7%
Total	328	33	10.1%	295	89.9%

6.3.2 Accounting standards within the Main market

It is not possible to present information on the choices of accounting standards by the firms whose annual reports are not available. Therefore, Table 6.3 shows the distribution of the use of the three types of GAAP within the sample studied and not the whole target sample. However, we should note that it is the target sample in the DAX, MDAX and SMAX categories, because the missing annual reports are confined to those unclassified.

Table 6.4, on the other hand, depicts GAAP choices over all the segments after exclusions. It can be seen from Table 6.4 that the lowest proportion of firms that use German GAAP is within the DAX segment. Furthermore, the proportions of firms using local GAAP within SMAX and Unclassified are the highest. It is also shown that the distribution of GAAP among segments, before the exclusions made to obtain the target sample, is not very different from that in Table 6.3.

Table 6.3: Distribution of accounting standards over Main Market segments before exclusions

Segment / **GAAP**	**DAX**	%	**MDAX**	%	**SMAX**	%	**Unclassified**[195]
G GAAP	5	16.6	36	51.4	81	76.4	N/A
IAS	16	53.3	23	32.9	22	20.8	N/A
US GAAP	9	30	11	15.7	3	2.8	N/A
Total	30	100	70	100	106	100	253

Produced by the researcher

[195] It is not possible to show the distributions of accounting standards over the unclassified firms because of the missing cases.

Table 6.4: Distribution of accounting standards over Main Market segments after exclusions

Segment / GAAP	DAX		MDAX		SMAX		Unclassified	
		%		%		%		%
G GAAP	4	18.2	29	49.2	67	72.8	105	86.1
IAS	12	54.5	20	33.9	22	22.8	12	9.8
US GAAP	6	27.3	10	16.9	3	3.3	5	4.1
Total	22	100	59	100	92	100	122	100

Produced by the researcher

6.3.3 Data collection

This section explains the nature of the data collected for the variables employed in this study. However, the justification for the choice of such variables is explained in chapter 5. The data in the financial statements presented in *Hoppenstedt* were checked against the original financial statements for a sample of firms. The result of this test showed the reliability of this database as a source of company accounts information. The process of data collection is described below according to the different variables[196]:

6.3.3.1 Size

Proxies chosen for size are employee numbers, total assets and turnover. Data for all these variables are available in *Hoppenstedt* 2003. The number chosen for the employee numbers variable is the average number[197]. The figure "Balance sheet total"[198] represents the total assets variable (see Section 6.3.3.6 for more explanation on this). Finally, "Turnover"[199] is the figure chosen by the researcher to represent sales and revenues in all firms.

6.3.3.2 Internationality

In the previous chapter, the researcher suggested the international sales figure as a suitable proxy for internationality. Still, not all German firms disclose international sales. After much work on the annual reports of the sample firms, the researcher realised that this figure is missing for a considerable number of firms. This was

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[196] This section discusses the nature of data collected and the issues related; whereas the previous Chapter discusses the justification and the logic behind choosing these different proxies.
[197] In Hoppenstedt, it is "Durchschnitt" under the section "Beschaeftigte"
[198] Translation of "Bilanzsumme"
[199] Reported as "Umsatz" in all firms in Hoppenstedt except for financial firms whose accounts are different

either because the annual reports for some firms were not available[200] or because of disclosure deficiencies. In some cases firms do not disclose this piece of data for competition reasons[201]. Furthermore, the researcher has emailed[202] and faxed firms with missing values. Still, the number of firms which responded to this correspondence was very limited. Doidge et al (2002) includes a list with the percentage of firms in 18 countries that have foreign sales data available on Worldscope. Germany came fourth in the list (after Italy, Malaysia and Japan respectively) with a percentage of 68.3%[203].

As a result of this, the alternative proxy suggested for this variable is a binary variable signifying whether a firm has a foreign subsidiary or not. Analysis of the data collected shows that 90.8 % of the companies having sales abroad, have at least a foreign subsidiary. This can be a good indication that, to a large extent, these two variables can substitute each other.

Another alternative that might be suggested here is the number of foreign subsidiaries. However, the latter can be criticised, as the number of subsidiaries does not reflect the materiality and importance of the subsidiaries. In other words, one foreign subsidiary in a specific country can be more important than a group of subsidiaries in another country[204].

6.3.3.3 Listing status

Although *Hoppenstedt* 2002 provides this piece of data, it does not include the changes in the firms' listing status in the period between October 2001 and before 31 December 2001. Thus, *Hoppenstedt* 2003 is used to ensure that such changes are taken into account. In general, only 42[205] listed German firms are listed abroad, of which 7 are financial firms. Table 6.5 below provides summarized information on the multi-listed firms included in this study. It is clear that a largest percentage of these firms are in DAX and MDAX. The firms' size may be the most convenient

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[200] Such firms were not excluded to reach the sample because the main resource of data was Hoppenstedt and not the annual reports (i.e. firms still can exist in the sample even if its annual report was not available)

[201] Puma AG is one example for this

[202] Such firms have been emailed more than one time

[203] We should note that this was over the sample period, which is between 1975 and 1999. What may be surprising is that this percentage in the UK and the US is 60.1 and 51.3 respectively

[204] Still the foreign sales can be tested informally within a reduced sample

[205] In addition to these 42 firms, other 3 firms which traded over the counter are listed abroad.

explanation for this observation. More details on cross listing are provided in Appendix 3.

Table 6.5: German firms listed abroad (only the ones included in the study)

Segment	Number of firms		Foreign exchanges
DAX	17	47.1 %	NYSE, SwX, Paris, NYSE, Tokyo, Toronto, London, Luxembourg, Madrid, Amsterdam, Antwerp, Barcelona, Brussels, Milan and Vienna (also San- Francisco and Philadelphia in case of Daimler Chrysler)
MDAX	8	23.5 %	SwX, London, NYSE, Luxembourg and Brussels
SMAX	2	5.9 %	SwX and NYSE
Unclassified	4	8.8 %	NYSE, SwX and Amsterdam
Neuer	5	14.7 %	NASDAQ (also NYSE in the case of Pfeiffer Vacum)
	35[206]	100.0	

Produced by the researcher

6.3.3.4 Ownership structure

For ownership concentration the proxy is the free float[207], which is taken from *Hoppenstedt* 2002. This number represents the percentage of capital available to the general public[208]. On the other hand, management ownership is tested through a proxy named MAN1 that represents the percentage of outstanding capital held by members of both the executive board and the supervisory board[209]. For sensitivity analysis, two other variables are tested. MAN2: This is MAN1 plus the percentage held by families that are represented by a family member on the management or supervisory board. Families' ownership can be identified under the section "Shareholders"[210] in *Hoppenstedt*. The researcher assumed that a member on the management or the supervisory board is a member of a particular family just if they are carrying the same family name[211]. Second is MAN3: that is MAN1 adjusted by the percentage held by families regardless of being represented by any members on the management board (see Leuz, 2000). Another proxy suggested to test the

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[206] 35 + 7 financial ones (excluded from the study) = 42. Still, 29 are included in the analysis of the Main Market because 5 are in the Neuer Markt and 1 from unclassified is not included

[207] It is under the name "Streubesitz" in Hoppenstedt

[208] As defined by Oxford Dictionary of Finance and Banking (1977)

[209] They are in Hoppenstedt under the names: Vorstand for the executive board and Aufsichtstrat for the supervisory board

[210] This section in German is named is "Aktionäre"

[211] This of course will exclude ownership of families that are not sharing their name with a manager even if he was in reality a member of this family. Therefore Man3 is introduced

hypotheses related to ownership structure is a binary variable that indicates whether a member of a local German bank is on the supervisory board. The researcher has chosen to exclude this variable because of lack of data and problems in identification[212].

6.3.3.5 Auditor Identity

The identity of a firm's auditor at the end of the financial year 2001 is presented in *Hoppenstedt* 2003 next to their financial statements. The binary variable is given one when the auditor is one of the Big-5 and 2 when the auditor is not one of the Big-5[213].

Table 6.6 provides an idea on the distribution of this type of auditors over the different market segments. It can be noticed that vast majority of DAX firms are audited by Big-5 auditors. Furthermore, the percentage of DAX firms having a Big-5 auditor is larger than that in MDAX and SMAX. Although the differences seem to be large, they are not statistically significant[214].

Table 6.6: A crosstabulation between market segments and auditor ID.

Segment	Non-Big 5	Big-5	Total
DAX	4	18	22
	18.2 %	81.8 %	
MDAX	23	36	59
	39.0 %	61.0 %	
SMAX	42	50	92
	45.7 %	54.3 %	
Unclassified	52	70	122
	42.6 %	57.4 %	
Total	121	174	295
	41 %	59 %	

Produced by the researcher

6.3.3.6 Leverage

For the purpose of this study and as suggested in chapter 5, leverage is calculated as the ratio of total liabilities to total assets. In *Hoppenstedt* 2003, liabilities are presented under the heading "Verbindlichkeiten"[215]. This number includes long-term debt and short-debt (but does not include deferred taxes or provisions such as

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[212] Still the researcher spent long time working on annual reports to extract this piece of information.
[213] KPMG, PricewaterhouseCoopers, Ernst & Young, Deloitte & Touche and Arthur Andersen (the later was still existed at the period of this study.
[214] Chi-square for this distribution is measured and it was not significant even at 0.1, which indicates the relationship between market segments and auditor type is not even marginally significant.
[215] Literal translation of this is "accounts payable". However, this might imply that they are current liabilities, but in fact they are not.

pension provisions). In order to calculate the leverage ratio, the researcher divided this figure by the total assets. This variable is coded as "LEVER".

It is important to note that under the Anglo-Saxon model, one might expect current liabilities to be subtracted from current assets in the balance sheet (net current assets). This gives raise to the question of whether Hoppenstedt takes account of this difference in its presentation of the total assets figure ('Bilanzsumme') or the total debt figure. Therefore, the researcher checked a random sample of the annual reports of companies reporting under each GAAP to see whether the database is consistent in presenting this regardless of the GAAP used. It seems that Hoppenstedt reports assets separately from the liabilities (i.e. current liabilities are not netted off). Therefore Hoppenstedt consistently reports total assets and total liabilities regardless of the GAAP used by the company.

It is also worth noting that the definition of leverage used here is arguable because it includes short-term debt, which is not commonly considered when defining leverage. However, total debt is the only figure available in Hoppenstedt and thus the researcher chose to be consistent in using this measure. Furthermore, this definition of leverage is used by other studies such as Dumontier and Raffournier (1998).

6.3.3.7 Profitability

Two measures are suggested in this research to proxy for profitability: the ratio of "profits before tax"[216] to total assets (PROFIT1) and ratio of "profits before tax" to turnover (PROFIT2). All figures are taken from *Hoppenstedt* 2003.

6.3.3.8 Foreign investors:

This variable is named (FORINVES) and includes all types of foreign investors existing on the body of investors. Shares in German companies are mostly bearer shares. This is assumed to mean that those mentioned in *Hoppenstedt* are only the significant investors, who may be holding more than 5 % (Khoudja, 2003). This observation also applies to the US investors, who are signified by another variable (USINVES).

6.3.3.9 Industries

The primary basis for classifying the sample firms into main industrial areas was the sectors designed by Deutsche Börse. The number of the sectors included in the

[216] This is in Hoppenstedt under the name "Ergebnis gew. Geschäftstätigkeit"

current research is 17, after excluding Banks and Insurance companies[217]. For the purpose of this analysis, two categorical variables were designed to test for the industry effect. Using a categorical variable is equivalent to using a group of dummy variables[218], as each category can be represented by a dummy variable except for the reference. In other words, 5 categories should be represented by only 4 dummies (Norusis, 2001). As shown in Table 6.7, industries were classified in a categorical variable with five categories (INDUS1) that are in level 2[219]. Sectors after that were regrouped into another categorical "INDUS2" with three categories.

Table 6.7: Distribution of firms within the categories of INDUS1

Sector	**DAX**		**MDAX**		**SMAX**		**Unclassified**		**Total**	
		%		**%**		**%**		**%**		**%**
Utilities	2		-		1		6		9	
Transportation	3		3		-		3		9	
Utilities and Transport	**5**	**22.7**	**3**	**5.1**	**1**	**1.1**	**9**	**7.4**	**18**	**6.1**
Basic resources	1		3		-		6		10	
Machinery	2		10		7		9		28	
Food and Beverages	-		2		4		12		18	
Industry	-		3		16		11		30	
Construction	-		4		12		12		28	
Automobile	3		3		4		5		17	
Manufacturing	**6**	**27.3**	**25**	**42.4**	**43**	**46.7**	**55**	**45.9**	**131**	**44.1**
Pharmaceuticals	1		10		10		3		24	
Chemicals	2		1		1		3		7	
Pharma and Chemicals	**3**	**13.6**	**11**	**18.6**	**11**	**12**	**6**	**4.9**	**31**	**10.5**
Consumer Cyclical	1		4		9		5		19	
Retail	2		5		11		10		28	
Finance	1		6		3		12		22	
Media	-		1		4		7		12	
Trading	**4**	**18.2**	**16**	**27.1**	**27**	**29.3**	**34**	**28.7**	**81**	**27.8**
Telecommunication	2		3		8		12		25	
Software	1		1		-		2		4	
Technology	1		-		2		2		5	
Technology	**4**	**18.2**	**4**	**6.8**	**10**	**10.9**	**16**	**13.1**	**34**	**11.5**
Total	**22**	**100**	**59**	**100**	**92**	**100**	**122**	**100**	**295**	**100**

Produced by the researcher

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[217] The number of sectors at the time of this study is 19 (including Banks and Insurance). However, the number at the current time (2004) is 18 (companies in the Machinery have been allocated to other sectors) (see www.Deutsche-boerse.com)

[218] A variable is defined as "Categorical" in SPSS, will be treated as a group of dummies.

[219] Level 1 is considered to be the 17 sectors designed by Deutsche Börse, whereas the levels 2 and 3 include the sectors after being regrouped by the researcher.

Table 6.8: Distribution of firms within the categories of INDUS2

Sector	DAX		MDAX		SMAX		Unclassified		Total	
		%		%		%		%		%
Utilities	2		-		1		6		9	
Transportation	3		3		-		3		9	
Telecommunication	2		3		8		12		25	
Software	1		1		-		2		4	
Services	**8**	**36.4**	**7**	**11.9**	**9**	**9.8**	**23**	**18.9**	**47**	**15.9**
Basic resources	1		3		-		6		10	
Machinery	2		10		7		9		28	
Food and Beverages	-		2		4		12		18	
Industry	-		3		16		11		30	
Construction	-		4		12		12		28	
Automobile	3		3		4		7		17	
Pharmaceuticals	1		10		10		3		24	
Chemicals	2		1		1		3		7	
Technology	1		-		2		2		5	
Manufacturing	**10**	**45.5**	**36**	**61**	**56**	**60.**	**65**	**53.2**	**167**	**56.6**
Consumer Cyclical	1		4		9		5		19	
Retail	2		5		11		10		28	
Finance	1		6		3		12		23	
Media	-		1		4		7		12	
Trading	**4**	**18.2**	**16**	**27.1**	**27**	**29.**	**34**	**27.9**	**81**	**27.5**
Total	**22**	**100**	**59**	**100**	**92**	**100**	**122**	**100**	**295**	**100**

Produced by the researcher

6.4 The Neuer Markt:

The number of firms in the Neuer Markt as in *Hoppenstedt* 2002 is 285. However, the figure presented by the World Federation of Exchanges (WFE) is different (272). The reason for this may be the number of firms that went bankrupt in the period (October 2001- December 2001)[220] (see chapter 2). For the Neuer Markt, the same exclusions are made to reach the sample. Just 5 of the firms are subsidiaries of other firms included in the sample. Unlike in the main market, firms in the Neuer Markt are required by Deutsche Börse regulations to comply with either IAS or US GAAP (Deutsche Börse AG). This requirement is unconditional on consolidating their accounts. Thus, those firms that do not produce consolidated accounts are excluded on the grounds of consistency. Furthermore, three firms of a financial nature are excluded to reach the target sample. As shown in Table 6.9, however, there were firms whose accounts were unavailable. Despite these missing cases, the percentage

[220] The researcher has received emails from some firms, which are in Hoppenstedt 2002 tells that they went bankrupt before the end of 2001.

of the sample studied to the target sample is still high. As with the Main market in the previous part, data from previous years for the missing cases were checked closely to see whether these missing firms are systematically different. The missing part from the target sample does not seem to cause any concern.

Table 6.9: Determining the Target Sample for the Neuer Markt

Segment	Orig.No	Owned	No. Cons	Finan. S	Target Sample	
Neuer	272	3	5	3	261	95.9%

Produced by the researcher

Table 6.10: Missing firms and sample size in the Neuer Markt

Target Sample	Missing cases		Sample studied	
261 (100%)	17	6.5%	244	93.5%

Produced by the researcher

6.4.1 Accounting standards in the Neuer Markt:

The sample includes 134 firms complying with IAS and 110 firms complying with USGAAP.

6.4.2 Data for the Neuer Markt:

Although the hypotheses related to Neuer Markt are somewhat different from those related to the Main Markt; the same set of data was collected for the firms in the Neuer Markt.

6.4.3 Industries in the Neuer Markt:

The number of sectors in the Neuer Markt is smaller than that in the Main Market. Some of these sectors have very small frequencies. In the first categorical variable, INDUS1 (6 categories), these sectors are included in one category labelled "OTHER". In the second categorical variable, INDUS2 (5 categories), the sectors TECHNO and TELECOM were included in "OTHER"; whereas the categories PHARMA, SOFTWARE and MEDIA stayed separate as in INDUS1[221].

[221] These categories were designed to show the best results (see Chapter7)

Table 6.11: Distribution of industries within INDUS1

Sector	**Frequency**	**%**
Chemicals	1	
Pharmaceuticals	23	
PHARMA	**24**	9.8 %
Software	107	
SOFTWARE	**107**	43.9 %
Technology	54	
TECHNO	**54**	22.1 %
Media	29	
MEDIA	**29**	11.9 %
Telecommunication	12	
TELECOM	**12**	4.9 %
Automobile	5	
Industry	6	
Utilities	1	
Transportation	4	
Retail	1	
Financial	1	
OTHER	**18**	7.4 %
	244	

6.5 Statistical analysis

The first section analyses the choice between GGAAP and IRAS. This section is concerned with the Main Market and is presented in Chapter 7. However, because companies in the Main Market have three choices (GGAAP, IAS and USGAAP), statistical analysis is designed to analyse the choice on the level of the three groups as well (explained more below).

The second main section analyses the choice between IAS and US GAAP, which takes place in both the Main Market and the Neuer Markt. This section is presented in Chapter 8. The analysis of the decision on IAS or US GAAP in the Main Market will be examined through a subsample of this market. This subsample comprises the 90 companies that use IRAS (see Figure 6.1 below).

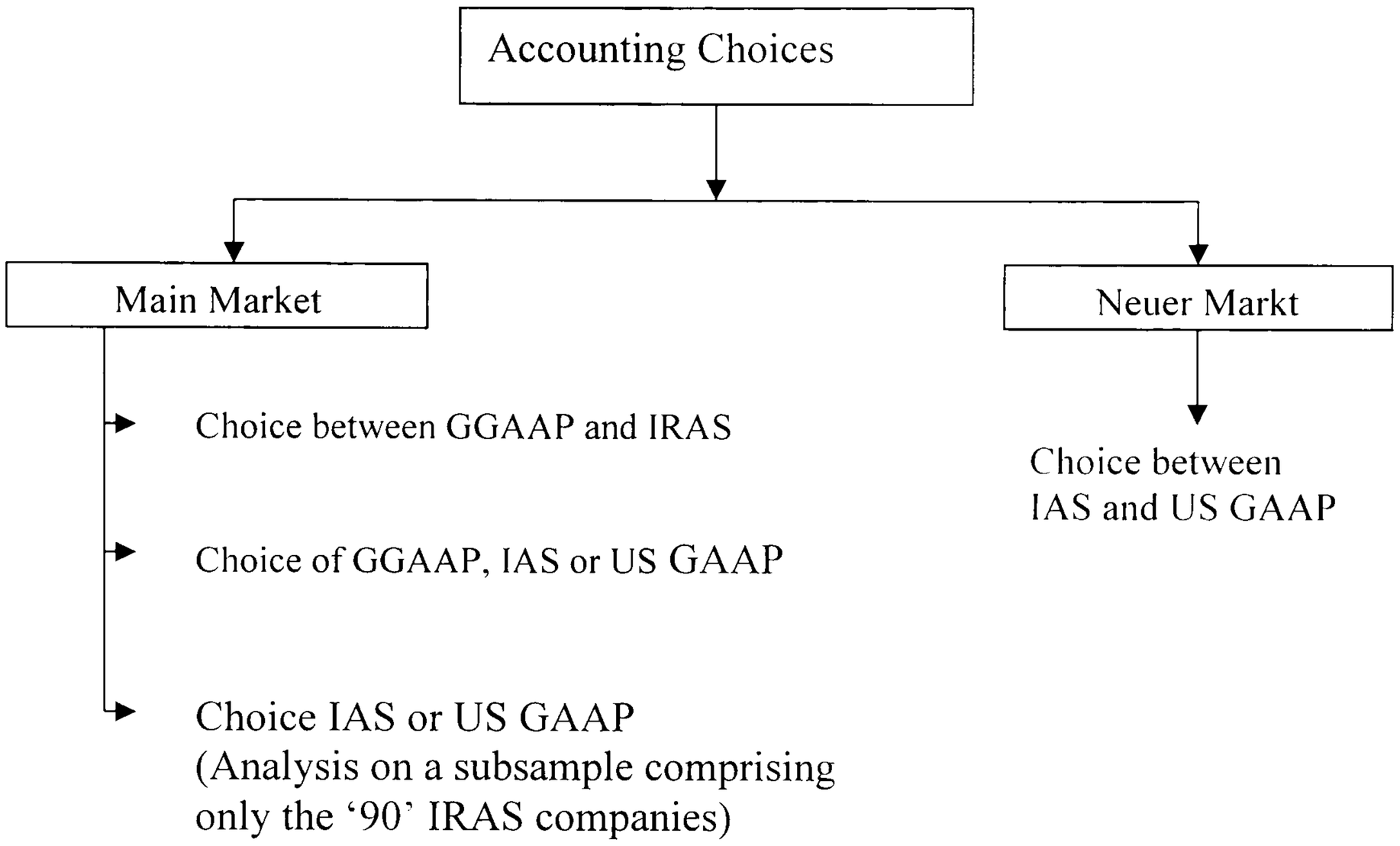

Figure 6.1: Accounting Choices in both the Main Market and the Neuer Markt

Another division of the statistical analysis is into three main types of analysis: univariate analysis, bivariate analysis and multivariate analysis. Figure 6.2, presented at the end of this chapter, provides clear details on the design of the statistical analysis in this research.

Yet, before continuing with this section, it may be more appropriate to introduce Table 6.12 which provides a summary with the variables, their level of measurement and the result of the normality test.

Table 6.12: A summary with variables in the study

Variable	Measurement Level	Normality test (Kolmogorov-Smirnov)	
		Main	Neuer
ACCSTAND	Nominal		
EMPNO	Interval[222]	.000	.000
ASSETS	Interval	.000	.000
TURNOV	Interval	.000	.000
LEVER	Interval	.200[223]	.000
PROFIT1	Interval	.000	.000
PROFIT2	Interval	.000	
FRFLOAT	Interval	.000	.000
MAN1	Interval	.000	.000
MAN2	Interval	.000	.000
MAN3	Interval	.000	.000
AUDID	Nominal[224]		
LIST	Binary		
FORSUB	Binary		
USSUB	Binary		
FOINVES	Binary[225]		
USINVES	Binary		
USLIST	Binary		
INDUS	Categorical		

6.5.1 Univariate analysis

Univariate analysis is concerned with examining one single variable. Bryman and Cramer (2001, p5) define univariate analysis as "the various ways of analysing and presenting the information relating to a single variable". Univariate analysis mainly presents information about frequency distribution, central tendency and dispersion.

The nature of univariate analysis is based upon the nature of a variable. Frequency distributions, measures of dispersion and measures used to analyse nominal variables, for example, are not suitable in the case of variables of an interval nature (continuous) such as leverage and total assets (Babbie et al, 2003, p76). Therefore, in order to make use of these useful statistical tools, such as frequency distribution, the

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[222] In SPSS, interval and ratio variables are lumped into a single variable "Scale" (Babbie et al, 2003). According to Norusis (1998, p61) "the distinction between interval and ratio scales is seldom, if ever, important in statistical analysis.

[223] This level of significance shows that the LEVER is normally distributed. Furthermore, it is the only normally distributed variable.

[224] Binary variable can be classified as categorical or nominal.

[225] FORINVES AND USINVES were originally measured in interval scale. As a result of the large number of zero cases, these variables were coded as binary (see Hosmer and Lemeshow (2000)

continuous variables were analysed in categorical form. However, in order to enrich the findings of this research, these variables are analysed again in their form as continuous variables. Some descriptive statistics such Mean, Standard Deviation, Minimum and Maximum are the type of univariate analysis that may be applied to continuous variables.

6.5.2 Analysis of differences and associations:

The statistical tools that can be used to analyse differences and associations namely significance tests (can be classified as univariable and bivariable analysis[226]) are employed to find differences between GGAAP, IAS and US GAAP across the different variables. Although the researcher does not consider the results of these tests in drawing his final research conclusions, they are considered as a primary step before the multivariable analysis and used to guide the discussions of its results.

A similar methodological approach is adopted by previous studies such as Dumontier and Raffournier (1998) Gray and Street (2002) and Leuz (2003) (see literature review in Chapter 5), it should be mentioned here that the use of the significance tests when having large sample, as in these studies and the current research, may be arguable (Garson, 2004). The researcher's point of view is that the data used in the current research and in these studies are only a sample (a snapshot) of all possible data sets that could be obtained from sample companies. If this research is repeated 6 months after or was carried out 6 months before, the results would probably show some variance across the different surveys (Maletta, 2004[227]). Second, to avoid criticisms about using the P values, the researcher uses the so-called confidence intervals which can be more reliable than the P values in concluding about mean differences (Simon, 2004[228]).

Two main groups of these tests (parametric and non-parametric) are used in this research.

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[226] There is real consensus on how to classify these tests. Whereas t-test, Mann-Whitney, and ANOVA and Kruskal-Wallis can be classified as univariable analysis because they analyse difference between groups in terms of a single variable, Chi-square and crosstabulations can be classified as bivariable analysis because they study the relationship between two variables.

[227] Personal email contact with Pr Hector Maletta, a consultant in the University of Salvador, Argentina. This idea is also supported by Dr Ian Dobbs and Mr Tony Miller from the Business School of Newcastle University and Mike Speed Professor of Statistics & Associate Dean for Technology Mediated Instruction in Texas A&M University

[228] Personal email contact with Dr Steve Simon, a Research Biostatistician in the Children's Mercy Organisation, Kansas, USA

6.5.2.1 Parametric tests

They are the statistical techniques which make assumptions on the nature of the populations from which the observations or data were drawn (Siegel and Castellan, 1988). The following are the parametric tests conducted in this research:

6.5.2.1.1 The independent t-test (2-sample t-test):

The test in general is a parametric test employed to examine whether two means are significantly different from one another. There are three types of t-test: the single t-test, the independent t-test and the paired t-test (Brace et al, 2003). As in this research we have more than one group and these groups are independent of each other, the independent t-test is the suitable choice. This test differences between the IRAS group (joining the two groups using IAS and USGAAP) and GGAAP group in the Main Market; whereas it tests the differences between the IAS group and USGAAP group either in the Main Market or the Neuer Markt. For the case with three groups of firms (German GAAP group, IAS group and US GAAP group), the independent t-test, can still be used. However, this will require running the test more than one time (one time between every two groups). A more efficient procedure than this is to run ANOVA.

6.5.2.1.2 Analysis of variance (ANOVA):

ANOVA is considered as an extension of the t-test that allows us to compare the means of more than two groups. ANOVA shows us whether the scores of independent groups significantly vary across these groups. However, a disadvantage of ANOVA is that it does not show us whether the G GAAP group is significantly different from the IAS group, whether the G GAAP is significantly different from the US GAAP group, or whether IAS group is significantly different from the US GAAP group. This drawback can be overcome by Tukey post-Hoc multiple comparisons procedure. This procedure will show whether there is any significant difference between each pair of groups on all the parametric variables.

6.5.2.1.2.1 Assumptions of the Independent t-test and ANOVA:

The following are the assumptions on which Student`s t-test and ANOVA are based, with a summary of their implications for the data set of the current work:

- The dependant[229] variables should be of interval or ratio scale. Variable of interval scale are: leverage, total assets, employees number, turnover, free float, and profitability and management ownership (before being transformed into a binary variable).

- The variables are normally distributed. The Kolmogorov-Smirnov normality test shows that the Leverage is the only variable which is normally distributed; nevertheless, Bryman and Cramer (2001) explain how robust these tests may be to departures from normality.

- The samples variances are all equal. Levene's test is run to check this assumption. In SPSS, this test can be run as an option under both ANOVA and the Independent t-test. For the Independent t-test, SPSS provide results under two conditions: equal variances assumed and equal variances not assumed.

- Samples should be random and independent. It is explained above that randomness should not cause concerns here. The second thing is that the samples involved in these tests are independent from each other as a firm in the IAS group, for example cannot be in the USGAAP group or GGAAP group

Finally, even if the assumptions for these tests are not fully met, their results can be used to be compared with those of non-parametric tests (Bryman and Cramer, ibid). Furthermore, Hosmer and Lemeshow (2000) suggest that the results of the t-test can be used to indicate which variables are qualified to be included the multivariable models.

6.5.2.2 Non-parametric tests:

Non-parametric tests do not require assumptions about the shape of the underlying distribution. Non-parametric or distribution-free tests do not depend on assumptions about the particular form of the distribution of the sampled populations and are not based on strict assumptions (Bryman and Cramer, 2001). For the purposes of this research, the need for this type of test applies to all the continuous variables except for leverage (LEVER), which is the only normally distributed variable.

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[229] For ANOVA in SPSS, the variable ACCSTAND is called "Factor", whereas the other variables such as leverage should be included in the "Dependent list". In other words, what you consider as an independent variable in the regression analysis is the dependent variable in ANOVA(vice versa)

6.5.2.2.1 Mann-Whitney U test:

For two independent samples, this test is the most commonly used alternative to the independent-samples t-test (Norusis, 1998). This test is employed to compare the two groups GGAAP and IRAS or IAS and US GAAP.

6.5.2.2.2 Kruskal-Wallis:

In the case where there are three groups or more such as is the case with having GGAAP, IAS and US GAAP, the Kruskal-Wallis test is the right choice. This non-parametric test is the alternative to one-way analysis of variance (ANOVA) (ibid).

6.5.2.2.2.1 Assumptions underlying the Mann-Whitney U test and Kruskal-Wallis:

In fact there is no absolute agreement between statisticians on the assumptions underlying non-parametric tests. Brace et al (2003) and Pagano (2001) agree that these tests can be run when data are of interval or ratio scale, but with serious violation to the assumptions of parametric tests such as ANOVA or the Independent t-test (normality and equality of variances). (Garson, 2004) and SPSS 11.0 guide, on the other hand, emphasize on an assumption that samples tested be similar in shape. Although there is no any particular test to check such assumption, the SPSS 11.0 guide suggests that this can be achieved using "Explore". Therefore, histograms with normal curve for all the variables in the different groups were plotted and compared. This comparison was mainly based on eyeball inspection[230]. The researcher did not see any significant differences which might cause concern.

6.5.2.2.3 Chi-square:

The chi-square test may be employed to reveal the significance of differences between two or more independent samples. According to Siegel and Castellan (1988, p.111), the measurement of the data analysed by this test "may be as weak as nominal or categorical scaling". Chi-Square can be also used for a combination between nominal and ordinal variables. It is described as "the most widely used test of significance, which estimates the probability that the association between variables is a result of random chance or sampling error by comparing the actual or observed distribution or responses we would expect if there were absolutely no association between two variables" (Babbie et al. p.305). For the purpose of this

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[230] This was based on personal communication with a number of statisticians via email and an advice Dr. Simon Kometa (SPSS specialist in Newcastle University)

study. chi-square is employed to investigate the association between the choices of a set of accounting standards as a dependent variable and each of the independent variables.

6.5.2.2.4 Crosstabulations (Contingency tables):

It is necessary to explain contingency tables within the explanation of the chi-square test, because they are the bases for calculating the chi-square statistic.

Babbie et al (2003, p.137) define a crosstabulation as "a matrix that shows the distribution of one variable for each category of a second variable". Contingency tables should be prepared in order to calculate the chi-square statistic. However, it is not the sole function of these tables. Crosstabulations or contingency tables can be used to explore the relationship between two variables. They can give you an approximate idea of whether there is an association between two variables or how strong this association is. On the other hand, the direction of such a relationship cannot be determined through contingency tables unless both variables are ordinal (ibid).

6.5.2.2.4.1 Assumptions for Chi-square

The most commonly known assumptions for Chi-square test in the literature are:

- The data are assumed to be a random sample.
- In the contingency tables, the expected frequencies for each category should be at least 1.
- No more than 20% of the categories should have expected frequencies of less than 5. Statisticians suggest that when the contingency tables have 20% of its cells with expected frequencies of less than five or when any of the cells has an expected frequency less than one (zero cell), that the resulting test statistic may be magnified and will lead to inappropriate conclusions (Siegel and Castellan 1988). For such violation, chi-square corrected for continuity (Yates' correction) can be used; nevertheless, this correction is valid only for 2×2 tables (ibid).

Violations of these assumptions, if any, will be reported when presenting the contingency tables in the following chapter.

6.5.3 Multivariable analysis

6.5.3.1 Logistic Regression

A logistic regression is a regression with a dependent variable that is a categorical dichotomy and one or more independent variables that are continuous or categorical. Logistic regression allows us to "predict which of two categories a person is likely to belong to given certain other information" (Field 2000 p163). However, prediction is not the only purpose of the logistic regression. A logistic regression can be also used for the purpose of classification and for the purpose of testing hypotheses (Menard, 2001). For the purpose of this research, multivariable logistic models are used to test a group of hypotheses that specific factors are associated with the fact that a company belongs to a particular category.

The choice between GGAAP and IRAS and between IAS and US GAAP can be represented by a binary variable, and hence logistic regression was the right choice for the multivariable analysis.

6.5.3.1.1 The choice of logistic regression over discriminant analysis:

Discriminant analysis is a statistical technique which can be used to find the most significant factors that discriminate between two or more groups or to predict a category membership. It might therefore seem to be relevant to the current research. Both discriminant analysis and logistic regression enable researchers to predict a categorical dependent variable on the basis of a number of predictors or independent variables. However, logistic regression has some advantages over discriminant analysis[231]. Unlike in discriminant analysis, the independent variables in the logistic regression need not be normally distributed, linearly related or have equal within-group variances (Garson, 2004). Furthermore, logistic regression allows us to use categorical independent variables. According to Brace et al (2003), the coefficients and the odds ratios produced by logistic regression are easier to interpret than values computed under Discriminant analysis which is quite arbitrary and tells us relatively little about the basis on which the prediction is being made. Another advantage of logistic regression over discriminant analysis is its applicability when group sizes are very unequal (Garson, ibid.). Therefore, the researcher believes that the choice of logistic regression is the most obvious choice for the purpose of this study.

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[231] Although the later is (or at least it used to be) a popular tool for predicting bankruptcy

6.5.3.1.2 Equations of the logistic regression

The logistic regression can be explained through its relationship with the linear regression and how different they are from each other. This difference is explained by the following equations:

The simple linear regression is used to predict the value of Y from a predictor X_1 through the following equation: $Y = \beta_0 + \beta_1 X_1 + \varepsilon_i$ (6.1)

On the other hand, a multiple linear regression predicts the value Y from a set of predictors through the following equation: $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_n X_n + \varepsilon_i$ (6.2)

Whereas the last equations are used to predict the value of Y, the logistic regression models are used to predict the probability of Y occurring given known values of predictors (Field 2000). The following shows the equations of logistic regression that are to be compared to the ones above:

The probability of Y occurring given a single predictor: $P(Y) = \frac{1}{1 + e^{-(\beta_0 + \beta_1 X_1 + \varepsilon_i)}}$ (6.3)

The probability of Y occurring given a set of predictors: $P(Y) = \frac{1}{1 + e^{-Z}}$ (6.4)

Where the logit[232] $Z = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_n X_n + \varepsilon_i$

In the equations (6.3) and (6.4) e is the base of natural logarithms, whereas the other coefficients are the same linear combination in the equations (6.1) and (6.2).

Field (2000) explains that when having a dichotomous dependent variable, the assumption of a linear relationship between variables will be violated. Logarithmic transformation can be used to treat this problem. The logistic regression model overcomes this problem because it expresses the multiple linear regression equation in logarithmic terms (ibid). Still the logit (the dependent variable) should be linear in each continuous independent variable (Hosmer and Lemeshow, 2000, Menard 2001).

The probability value of Y varies between 0 and 1. In the case of this research, values close to one means that a firm is very likely to belong to a certain group (IRAS or G GAAP in the Main Market and IAS or US GAAP in the Neuer Markt).

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[232] this is the statistical name for this equation.

On the other hand. a value of Y close to zero means that a firm is very unlikely to belong to a particular group.

6.5.3.1.3 Multinomial Logistic Regression

The multinomial logistic regression (also called Polytomous logistic regression) is an extension of the binary logistic regression explained above (Menard 2001). The use of this extension allows us to deal with a dependent variable with more than two categories. It is explained by Norusis (2001) that when you have two groups of which one has experienced the event of interest and another one has not. the logistic regression model will be written as:

$$\log\left(\frac{P(event)}{1-P(event)}\right)=\beta_0+\beta_1X_1+\beta_2X_2+\ldots+\beta_pX_p \qquad (6\text{-}5)$$

According to Norusis (ibid), in this case we have just one non-redundant logit. because modelling the logit $\log\left(\left(1-P(event)\right)\Big/P(event)\right)$ results in the same logistic regression coefficients but with reversed signs.

The probability of an event occurring divided by the probability of that event not occurring (the left part of the equation (6-4) is called the Odds ratio (Field, 2000).

When a dependent variable has J possible values, the number of non-redundant logits will be $J-1$. Each logit compares each category to a baseline category. This type of logits is called the baseline category logit:

$$\log\left(\frac{P(category_i)}{P(category_J)}\right)=\beta_{i0}+\beta_{i1}X_1+\beta_{i2}X_2+\ldots+\beta_{ip}X_p \qquad (6\text{-}6)$$

Two subscripts are assigned to each coefficient: the first identifies the logit (i) and the second identifies the variable (P).

For the case of the Main Market where we have three categories (groups), we have two logits (3-1 that is $(J-1)$). The group of German GAAP is chosen as the baseline category (the reference category). Therefore, the following logits were formed:

$$g_1=\log\left(\frac{P(IAS)}{P(G\,GAAP)}\right)=\beta_{i0}+\beta_{i1}X_1+\beta_{i2}X_2+\ldots+\beta_{ip}X_p \qquad (6\text{-}7)$$

$$g_2 = \log\left(\frac{P(US\ \text{GAAP})}{P(G\ GAAP)}\right) = \beta_{i0} + \beta_{i1}X_1 + \beta_{i2}X_2 + \ldots + \beta_{ip}X_p \quad (6\text{-}8)$$

$$g_3 = 0 \quad (6\text{-}9)$$

The third logit is equal to zero because it is a redundant logit. This can be simply explained by the following equations:

$$\because\ g_3 = \left(\frac{P(G\ \text{GAAP})}{P(G\ GAAP)}\right) = 1, \text{ and } \because\ \log(1) = 0$$

$$\therefore g_3 = 0$$

The probability of which a firm belongs to a certain group is calculated using the results from the logits (6-7), (6-8) and (6-9). The formula to calculate this probability is:

$$P(group_i) = \frac{\exp(g_i)}{\sum_{k=1}^{J}\exp(g_k)} \quad (6\text{-}10)$$

An additional pairwise comparison that includes both IAS and US GAAP can be formed by changing the baseline category to either IAS or US GAAP group. The researcher chose to put the IAS group as a base line. Thus, the third logit will take the following form:

$$\log\left(\frac{P(US\ \text{GAAP})}{P(G\ GAAP)}\right) = \beta_{i0} + \beta_{i1}X_1 + \beta_{i2}X_2 + \ldots + \beta_{ip}X_p \quad (6\text{-}11)$$

This last logit will not be used in calculating the equation (6-10). However, it can give additional information when interpreting the results of regression.

6.5.3.1.3.1 Assumptions for the logistic models:

Both, binary logistic regression and multinomial logistic regression have the same underlying assumptions (SPSS Inc, 2001). This may also be confirmed by Menard (2001) and Hosmer and Lemeshow (2000). Assumptions for logistic regression are discussed and in Chapter 7, where they are tested in on a section on evaluating the adopted model.

6.6 Summary:

The Figure 6.2 presented below summarises the statistical analysis suggested. The chart provides a complete view of the statistical work and how it is designed to suit the different choices decisions by German companies in FWB.

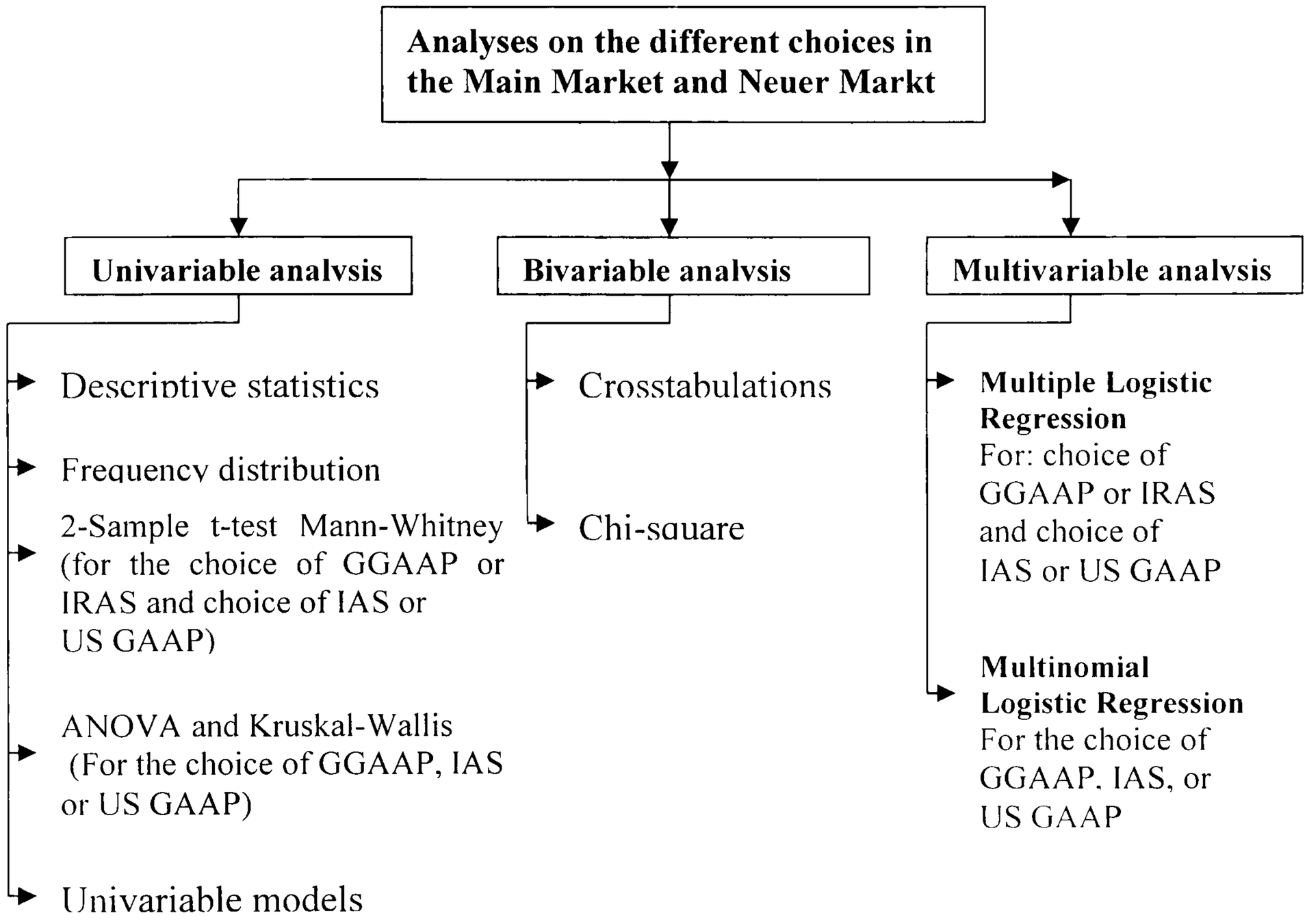

Figure 6.2: Designed statistical analysis

7 Chapter 7: Choice between German GAAP and IRAS

7.1 Introduction

This chapter presents and discusses the results of the analysis of the underlying reasons for the choice between G GAAP and IRAS in the main market, while analysis of the choice between IAS and US GAAP is presented and discussed in Chapter 8. As shown in diagram 7.1, results are presented at three levels: univariable analysis, bivariable analysis and multivariable analysis.

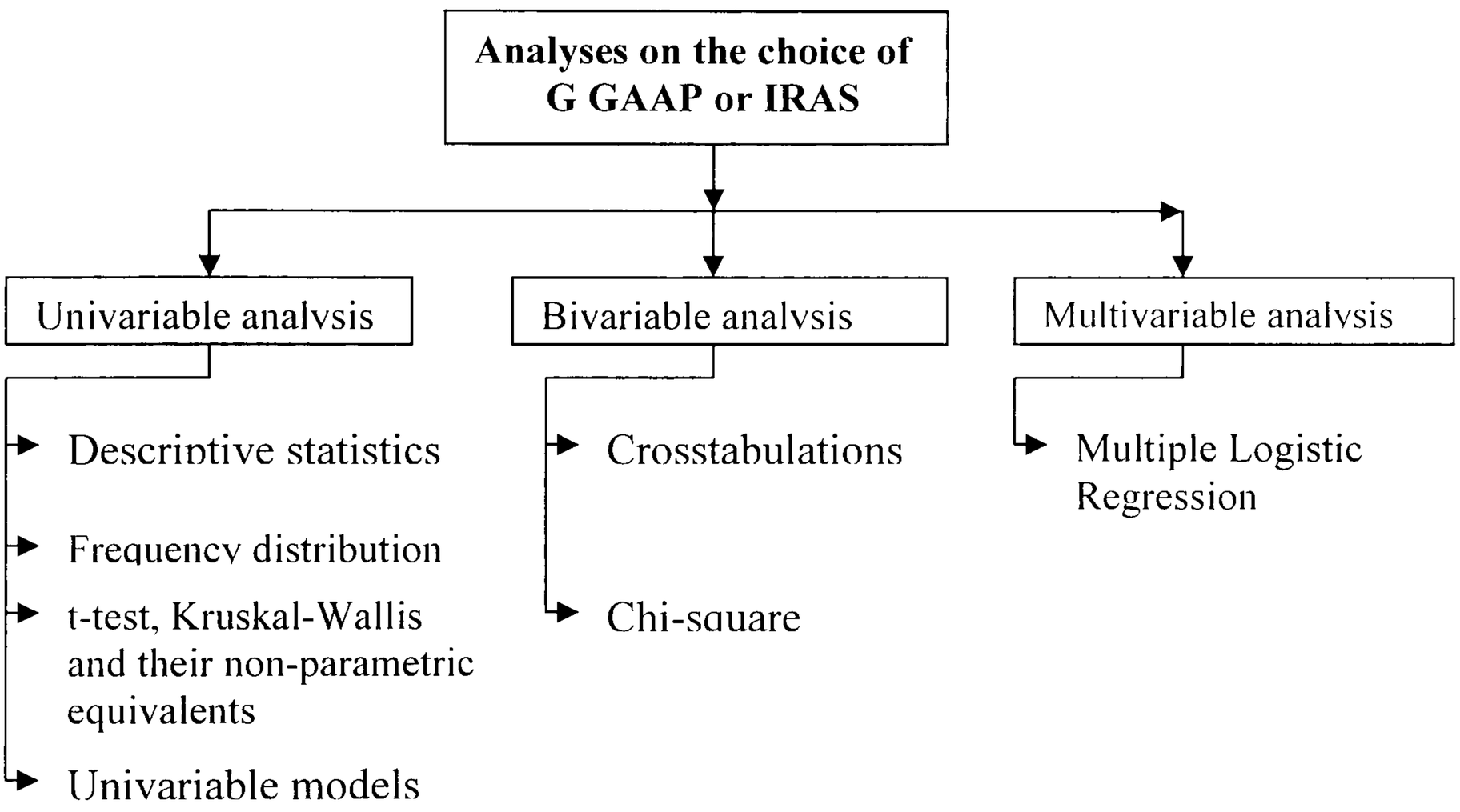

Figure 7.1: Analysis design for the choice between GGAAP and IRAS

7.2 Descriptive statistics on continuous variables:

Table 7.1 provides a summary of important descriptive statistics which may help in reading the different results presented later in the chapter.

7.2.1 Continuous variables:

Table 7.1: Descriptive statistics of the continuous variables

Variable	Unit	Min	Max	Mean	Range	25th	50th	75th
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
EMPNO	Person	1	477100	16395	477099	575	2080	8177
EMPNO exc. extremes[233]		1	57386	5142.1	57385	547	1769	5501
TOASSET	€ Mio	3.5	207410	5020	207407.5	99.5	306.4	1155
TOASSET exc. Extremes		3.5	8016	766.5	8012.5	94.4	256	737.3
TURNOV	€ Mio	0	152873	4079	152873	111.2	334.2	1427
TURNOV exc. Extremes		0	9076	953.5	9076	103	276	919.5
PROFIT1	%	-133	37	0.009	170.7	-0.7	3.2	7.9
PROFIT1 exc. Extremes		-26.1	37.4	3.6	63.5	0.4	3.4	8.2
PROFIT2	%	-148	82	-0.225	148.89	-0.42	2.97	7.1
LEVER1	%	6.8	93.8	0.474	87	32	47.1	63.2
FRFLOAT	%	0	100	35	100	13.5	32.6	49.7

Variables as defined below Table 7.4

Columns 7, 8 and 9 of Table 7.1 show three percentiles for each variable. Comparing the maximum values of variables such as EMPNO, TOASSET and TURNOV with the 75th percentile of these variables shows the large gap between the vast majority of value and the extreme values (defined below). In other words, whereas 75% of the firms have a number of employees in the range of between 1 and 8,177 (8176), 25% are in the range between 8,177 and 477,100 (460,746[234]). The same note applies to the variables TOASSET and TURNOV. This is caused by the extreme values in most of the DAX companies and a few other companies. Therefore, the researcher chose to compare the descriptive statistics of these variables with those after excluding the extreme values. This exclusion resulted in very different descriptive statistics, where the range is much smaller. This also shows how the mean was distorted by these extreme values.

7.2.1.1 Outliers and extreme values:

The impact of outliers can affect and distort the results of any the different types of statistical analyses (Bryman and Cramer, 2001). Such values had to be identified and their effect investigated by sensitivity analysis. As there is no universal definition of what constitutes an outlier, the researcher chose to use the Box-plot definition, which is defined by Norusis (1998) and used in SPSS. According to this definition, the values which are 1.5 box lengths from the upper or lower edge of the box are called outliers (box length = (75th percentile – 25th percentile)). Values which are 3 box-

[233] These descriptive statistics are calculated after excluding what was defined as extreme values.
[234] This figure is to show how wide the range covered by the highest quartile (the last 25%) is.

lengths from the upper or lower edge of the box are called extreme values (Bryman and Cramer, ibid; Norusis, ibid). Although the researcher identified both values, the ones taken out in Table 7-1 above are the extreme values and not the outliers[235].

7.2.1.2 Dichotomizing particular continuous variables:

Variables measured on an interval or ratio scale (continuous) are in statistical terms stronger than any other type of variables (Castellan and Siegel, 1988)[236]. Therefore dichotomizing a continuous variable is debatable. Streiner (2002, p.262) explains that it "results in lost information and reduced power of statistical tests". However, in particular situations such a procedure is imposed by practical needs. The variables MAN1, MAN2, MAN3, FORINVES and USINVES were primarily measured on an interval scale. Yet, the majority of values (more than 50%) in these variables are zero. Hosmer and Lemeshow (2000) and Streiner (2002) suggest that such variables should be dichotomized into 0 and 1. Therefore, these five variables are treated as binary variables.

7.2.1.3 Frequency distributions for continuous variable:

The best way to study the frequency distribution for continuous variables is to break them into intervals (Babbie et al 2001). There are no universal rules for categorizing continuous variables. Hence, this process was achieved through different schemes which took into account the nature of each variable. Those schemes are explained in separate footnotes below. Although information about frequency distribution can be found in the contingency tables shown later below, Tables 7.2 and 7.3 give a clearer view.

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[235] This was because the researcher wanted only to illustrate how such values can impact the analysis.
[236] Variables meant here are categorical and ordinal.

Table 7.2: Frequency distribution of the continuous variables

Variable	**Interval**	**Level**	**Frequency**	**Percent**
Employee numbers[237]	> 19580	Large (1)	35	11.9 %
	3434 – 19580	Medium (2)	79	26.7 %
	< 3434	Small (3)	181	61.4 %
			295	100.0 %
Total assets	> 2738	Large (1)	45	15.2 %
€ Mio	441 – 2738	Medium (2)	79	26.8 %
	< 441	Small (3)	171	58.0 %
			295	100.0 %
Turnover	> 3290	Large (1)	44	14.9 %
€ Mio	539 – 3290	Medium (2)	76	25.8 %
	> 539	Small (3)	175	59.3 %
			295	100.0 %
Profitability1[238]	> 0.063	High	93	31.5 %
Decimal	0 - 0.063	Low	124	42.0 %
(Profit to total assets)	< 0.0	Unprofitable	78	26.4 %
			295	100 %
Profitability 2[239]	> 0.055	High	94	0.3 %
(Decimal)	0 - 0.055	Low	123	1.0 %
(Profit to turnover)	< 0.0	Unprofitable	78	96.9 %
			295	100 %
Free float[240]	> 0.475	High (1)	81	27.5 %
(Decimal)	0.20 – 0.475	Medium (2)	120	40.7 %
	< 0.20	Low (3)	94	31.9 %
			295	100.0 %
Leverage[241]	> 0.648	High (1)	65	22.1 %
(Decimal)	0.358 – 0.648	Medium (2)	145	49.0 %
	< 0.358	Low (3)	85	28.9 %
			295	100.0 %

[237] Employees' numbers, total assets and turnover are categorized by isolating the outliers, as defined above, in the category "High", whereas the rest were divided above and below the average (Medium and Low respectively).

[238] Both profitability variables are categorized by isolating unprofitable in a separate category "Unprofitable", whereas profitable firms were categorized as above and below the average.

[239] Although the frequencies seem to be similar to that of Profitability 1, there is clear difference when you look closely at the data set (i.e. in several cases, a firm where categorized as High in Profitability1, whereas it was categorized as Low in Profitability 2). This implies that we may get different results for each of the two variables.

[240] Firms in the category "Low" are those with free float of less than 20 % (the minimum free float for DAX and SMAX), whereas the values larger than 20 % are divided above and below the average (Medium and High respectively).

[241] Leverage is categorized by dividing the variable into three equal intervals after excluding outliers. Outliers are included back in the "High" category. Interestingly, these categories are consistent with categories used in a study by Spremann and Gantenbein (2001).

7.2.2 *Categorical variables:*

Apart from the variables used to represent industries, all the categorical variables in this part of analysis are binary variables with two possible outcomes. The following table shows the frequency distribution these variables:

Table 7.3: Frequency distribution of the categorical variables

Variable	**Distribution**		
AUDID	YES	174	59 %
Has a Big-5 auditor	NO	121	41 %
		295	
LISTSTAT	YES	25	8.5 %
Listed abroad	NO	270	91.5 %
		295	
FORSUB	YES	234	79.3 %
Has a foreign subsidiary	NO	61	20.7 %
		295	
FORINVES	YES	83	28.1 %
Has Foreign investors	NO	212	71.9 %
		295	
FORMAN	YES	102	34.6 %
Has a Foreign manger	NO	193	65.4 %
		295	
MAN1	YES	93	31.5 %
Does management ownership exist?	NO	202	69.5 %
		295	
MAN2	YES	124	42 %
(including families ownership)	NO	171	58 %
		295	
MAN3(including families ownership[242])	YES	135	45.8 %
	NO	160	54.2 %
		295	
SEGMENT	YES	173	58.6 %
Is the company classified in DAX, MDAX or SMAX?	NO	122	41.4 %
		295	
INDUS1	U & T	18	6 %
Industry variable with 5 sectors	MANUF1	131	44.4 %
	P & C	31	10.5 %
	TECHNO	34	11.5 %
	TRAD1	81	27.5 %
		295	
INDUS2	SERVIC	47	15.9 %
Industry variable with 3 sectors	MANUF2	167	56.6 %
	TRAD2	81	27.5 %
		295	

[242] Whereas in MAN2, the families' ownership is only considered when a member of the family is on the supervisory or the management board, in MAN3 families' ownership is considered whether they have members on these boards or not.

The percentages and frequencies presented in Table 7.3 do not seem to need any comments. Furthermore, explanations about the contingency tables below highlight more about these observations.

7.3 Correlation Matrix:

The correlation matrix presented in Table 7.4 below includes all the variables examined in this chapter. This matrix is mainly produced to provide better understanding of the complex relationship between these variables. Correlations between the variables can help in explaining the results obtained from the different types of statistical analysis presented below. It is also intended to help in avoiding multicollinearity which can be caused by high correlation between independent variables.

In Table 7.4, one can see the very high significant correlation between the size variables which indicates that these variables provide similar information content. Some of the observations in the matrix are expected according to the extant literature. Examples of such observations are: the significantly negative correlation between free float (FREFLOAT) and management ownership (although it is not for MAN1) and the significantly negative correlation between leverage and profitability (see Chapter 8 for further explanation).

Furthermore, whereas some of the observations can be clearly explained or justified, some other observations do not have clear justifications. For example, it is easy to understand the significant positive correlation between FORINVES, USINVES, FORMAN and USMAN. The explanation of this is that each company which has US investors is classified as having foreign investors. Furthermore, it is likely to have US managers and to be, in turn, classified as having foreign managers. On the other hand, there is no a clear or direct explanation for the significantly negative correlation between USSUB (having a subsidiary in the US) and each of the management ownership variables.

Table 7.4: Correlation Matrix (including all the variables of the study)

	EMPNO	TOASSET	TURNOV	LEVER	PROFIT1	FRFLOAT	MAN1	MAN2	MAN3	PROFIT2	FORSUB	SEGMENT
EMPNO	**1.000**[243]											
ASSETS	**0.763**											
TURNOV	**0.863**	**0.851**										
LEVERAGE	**-0.066**	**-0.143**	**-0.091**									
PROFIT1	**0.044**	**0.091**	**0.082**	**-0.482**								
FREFLOAT	**0.039**	**0.092**	**0.067**	**0.048**	**0.115**							
MAN1	**-0.137**	**-0.125**	**-0.138**	**0.053**	**0.147**	**0.138**						
MAN2	**-0.164**	**-0.139**	**-0.174**	**0.030**	**0.078**	**-0.147**	**0.378**					
MAN3	**-0.120**	**-0.128**	**-0.156**	0.026	0.073	**-0.178**	**0.320**	**0.879**				
PROFIT2	-0.011	**0.173**	0.014	**-0.355**	**0.725**	**0.114**	0.102	0.051	0.037			
FORSUB	**0.185**	**0.132**	**0.145**	-0.044	0.009	0.095	-0.057	-0.004	0.044	-0.054		
SEGMENT	**0.184**	**0.195**	**0.132**	-0.016	**0.163**	**0.383**	0.082	0.081	**0.129**	0.093	**0.153**	
USSUB	**0.290**	**0.245**	**0.251**	**-0.125**	0.090	0.033	**-0.140**	**-0.163**	**-0.077**	0.008	**0.425**	**0.228**
AUDID	0.083	**0.172**	**0.109**	-0.066	-0.012	**-0.114**	-0.058	**-0.124**	**-0.114**	-0.021	0.042	-0.027
LIST	**0.339**	**0.375**	**0.365**	-0.083	**0.123**	**0.244**	0.042	-0.009	-0.029	0.076	0.107	**0.185**
FORINVES	0.035	0.030	0.088	-0.057	**-0.127**	**-0.116**	-0.035	**-0.180**	**-0.227**	-0.095	0.011	**-0.198**
USINVES	-0.086	-0.089	-0.101	-0.013	-0.092	0.001	0.049	0.005	-0.018	-0.080	0.012	**-0.131**
FORMANG	0.064	0.072	**0.112**	-0.058	-0.070	-0.049	-0.094	**-0.115**	**-0.120**	-0.085	**0.219**	-0.084
USMANG	0.036	**0.127**	0.106	-0.095	0.016	0.075	-0.083	-0.105	**-0.124**	-0.036	**0.132**	0.018
UANDT	-0.030	0.095	-0.038	-0.067	-0.071	-0.091	-0.010	-0.072	-0.088	0.029	-0.009	**-0.138**
TRAD1	**-0.113**	-0.091	-0.103	**0.196**	-0.066	-0.028	0.066	0.042	-0.014	0.079	**-0.128**	0.057
MANUF1	0.029	-0.047	0.007	0.003	0.025	-0.043	0.002	-0.045	-0.037	-0.090	**0.107**	-0.051
PANDC	**0.149**	**0.205**	**0.189**	**-0.169**	0.098	0.057	-0.070	0.064	0.070	0.042	-0.091	**0.164**
TECHNO	-0.008	-0.043	-0.017	-0.078	0.006	0.105	-0.023	-0.003	0.063	-0.022	0.094	-0.063

Note: **bold** typeface indicates a statistically significant correlation at the 0.05 level.

[243] The correlation of each variable with itself is 1.

Table 7.4: continued

	USSUB	AUDID	LIST	FORINVES	USINVES	FORMAN	USMAN	UANDT	TRAD1	MANUF1	PANDC	TECHNO
EMPNO												
TOASSET												
TURNOV												
LEVER												
PROFIT1												
FREFLOAT												
MAN1												
MAN2												
MAN3												
PROFIT2												
FORSUB												
Segmented												
USSUB												
AUDID	**0.183**											
LIST	**0.209**	0.093										
FORINVS	-0.024	**0.125**	-0.085									
USINVS	0.019	-0.099	0.053	**0.355**								
FORMAN	**0.188**	0.020	0.077	**0.472**	**0.146**							
USMAN	0.099	0.044	**0.204**	**0.185**	**0.189**	**0.374**						
UANDT	**-0.122**	0.034	-0.042	0.023	0.061	-0.045	-0.052					
TRAD1	**-0.149**	0.056	-0.078	0.034	-0.087	-0.068	-0.038	**-0.119**				
MANUF1	0.023	-0.050	**-0.119**	-0.014	-0.012	**0.108**	0.027	**-0.192**	**-0.576**			
PANDC	0.057	-0.024	**0.222**	-0.038	-0.002	**-0.131**	0.036	-0.064	**-0.192**	**-0.309**		
TECHNO	**0.185**	0.002	**0.113**	-0.004	0.101	0.069	0.008	-0.075	**-0.225**	**-0.361**	**-0.121**	**1.000**

Note: **bold** typeface indicates a statistically significant correlation at the 0.05 level.

EMPNO: employee numbers, TOASSET: total assets, TURNOV: turnover, LEVER: leverage which defined as total debt (long-term debt +short-term debt)/ total assets, PROFIT1: profits before tax to total assets, PROFIT: profit before tax to turnover, FREFLOAT: the percentage of equity offered for the public (not held by permanent shareholders), MAN1: the percentage of equity held by managers in the continuous form (BIMAN1= a binary form indicates whether a proportion of

the equity is held by managers or not). MAN2: whether managers and family members (have their names on the boards) own equity or not (BIMAN2 is the binary form). MAN3: whether managers and family own equity or not (regardless whether family members are on the boards or not). FORSUB: whether a company has subsidiaries abroad or not, SEGMENT: whether a company is classified in a quality segment or not. USSUB: whether a company has a subsidiary in the US or not. AUDID: whether a company have a Big-5 auditor or not. LIST: whether a company is listed abroad or not, USINVES: whether a company has US investors or not. FORMAN: whether a company has foreign managers or not, USMAN: whether a company has US managers on the boards or not, U&T: whether a company is classified as 'Utilities and Transportation' or not, TRAD: whether a company is classified as 'Trading' or not, MANUF: whether a company is classified as 'Manufacturing' or not. PANDC: whether a company is classified as 'Pharmaceuticals and Chemicals' or not, TECHNO: whether a company is classified as 'Technology' or not.

7.4 Crosstabulation and Chi-square results:

As explained in Chapter 6 crosstabulations (contingency tables) are employed to examine the relationship between the choice of GAAP and each variable separately. This relationship is shown in the distribution of each variable over the two groups of firms (G GAAP firms and IRAS firms).

As with the frequency distribution, to take advantage of this statistical tool, the continuous variables should be in the ordinal form shown in Table 7.2 above.

One general rule to be remembered in reading these tables is: the larger the differences across the groups, the stronger the association (Babbie, 2003). However, a relationship is only stated, if the chi-square statistic is significant. Calculation of this statistic is based on these tables. Results of the chi-square test are also shown at the bottom of the relevant tables.

7.4.1 Crosstabulations and chi-square test for categories of continuous variables:

7.4.1.1 Size:

Table 7.5 contains three contingency tables which investigate the relationship the between size, represented by three variables, and the choice of G GAAP or IRAS.

Table 7.5: Size categories and choice between GGAAP and IRAS

	Small	**Medium**	**Large**	**Total**
Group / EMPNO	**< 3434**	**3434 – 19580**	**> 19580**	
G GAAP	144	53	8	205
	70.2 %	25.9 %	3.9 %	100 %
IRAS	37	26	27	90
	41.1 %	28.9 %	30.0 %	100 %
Total	181	79	35	295
	61.4 %	26.8 %	11.9 %	100 %
$\chi^2 = 44.769$				P = .000
/ TOASSET	**< € 2738 Mio**	**441 – 2738**	**> 2738**	
G GAAP	136	57	12	205
	66.3 %	27.8 %	5.9 %	100 %
IRAS	35	22	33	90
	38.9 %	24.4 %	36.7 %	100 %
Total	171	79	45	295
	58.0 %	26.8 %	15.3 %	100 %
$\chi^2 = 47.322$				P = .000
/ TURNOV	**< € 539 Mio**	**539 – 3290**	**> 3290**	
G GAAP	138	54	13	205
	67.3 %	26.3 %	6.3 %	100 %
IRAS	37	22	31	90
	41.1 %	24.4 %	34.4 %	100 %
Total	175	76	44	295
	59.3 %	25.8 %	14.9%	100 %
$\chi^2 = 40.445$				P = .000

Variables as defined below Table 7.4

As can be seen in Table 7.5, the proportional distribution over the different size categories is very similar across the three proxies for size.

The proportional differences between the companies using IRAS and those using G GAAP, within the levels "Large" and "Small", are substantial (larger than 10 percentage points[244]). The largest proportion of G GAAP companies is classified as "Small", whereas the smallest proportion is classified as "Large". Although, the largest proportion of IRAS companies is also classified as "Small", it is substantially

[244] Babbie et al (ibid) suggest that a 10 % can be used as a rule of thumb, they also state that others suggest 6 % or 8% as a rough indicator of an existing relationship.

less than that of G GAAP firms. On the contrary, the proportion of IRAS firms in the "Large" category is considerably bigger than that of G GAAP companies.

This is a clear indication that companies using G GAAP are more likely to be smaller than those using IRAS in terms of employees' numbers, turnover and total assets. Both groups of firms have the smallest proportion in the category "Medium".

The high significance of chi-square statistics (shown at the end of each contingency table in Table 7.5) indicates that the relationship between each of the size variables and the choice of GAAP is significant at 0.000[245].

The scatterplot presented below in Figure 72 and Figure 7.2 show clearly that companies using IRAS are distributed across higher levels of employee numbers and total assets than G GAAP companies. That is IRAS firms seem to have more assets and more employees. Firms have a very similar distribution over the levels of turnover. Hence, there was no need to present another scatterplot which is nearly identical to those presented below.

Still, it is clear that not all GGAAP firms are small. From Figure 7.2, one can see that some very large companies are using GGAAP (a discussion of this observation is presented below at the end of this section).

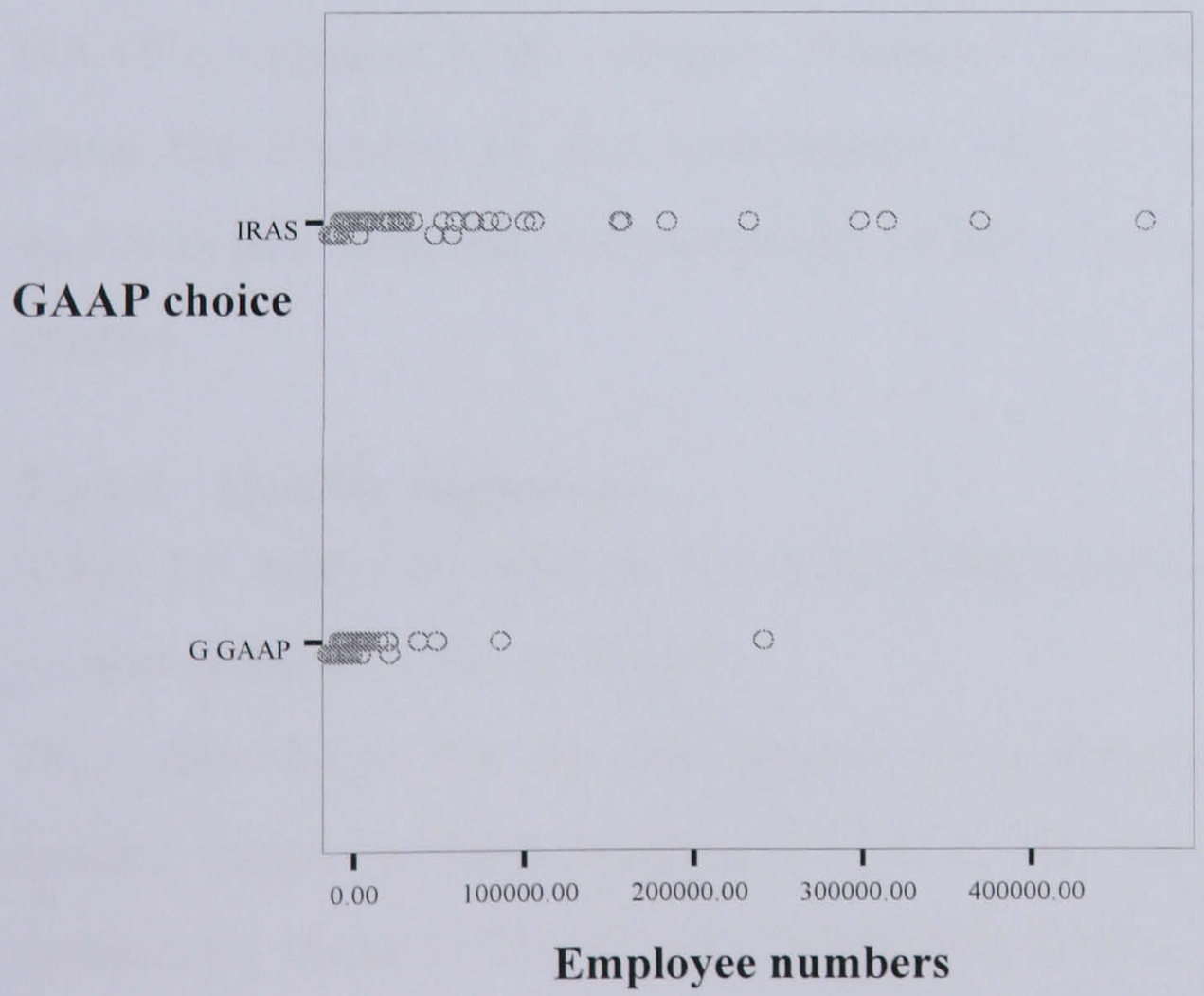

Figure 7.2: A scatterplot of employee numbers across GGAAP and IRAS groups

[245] Although the relationship is significant at a higher level of confidence (0.999), the level of confidence used for this study is 95 % which is the most commonly used in social research.

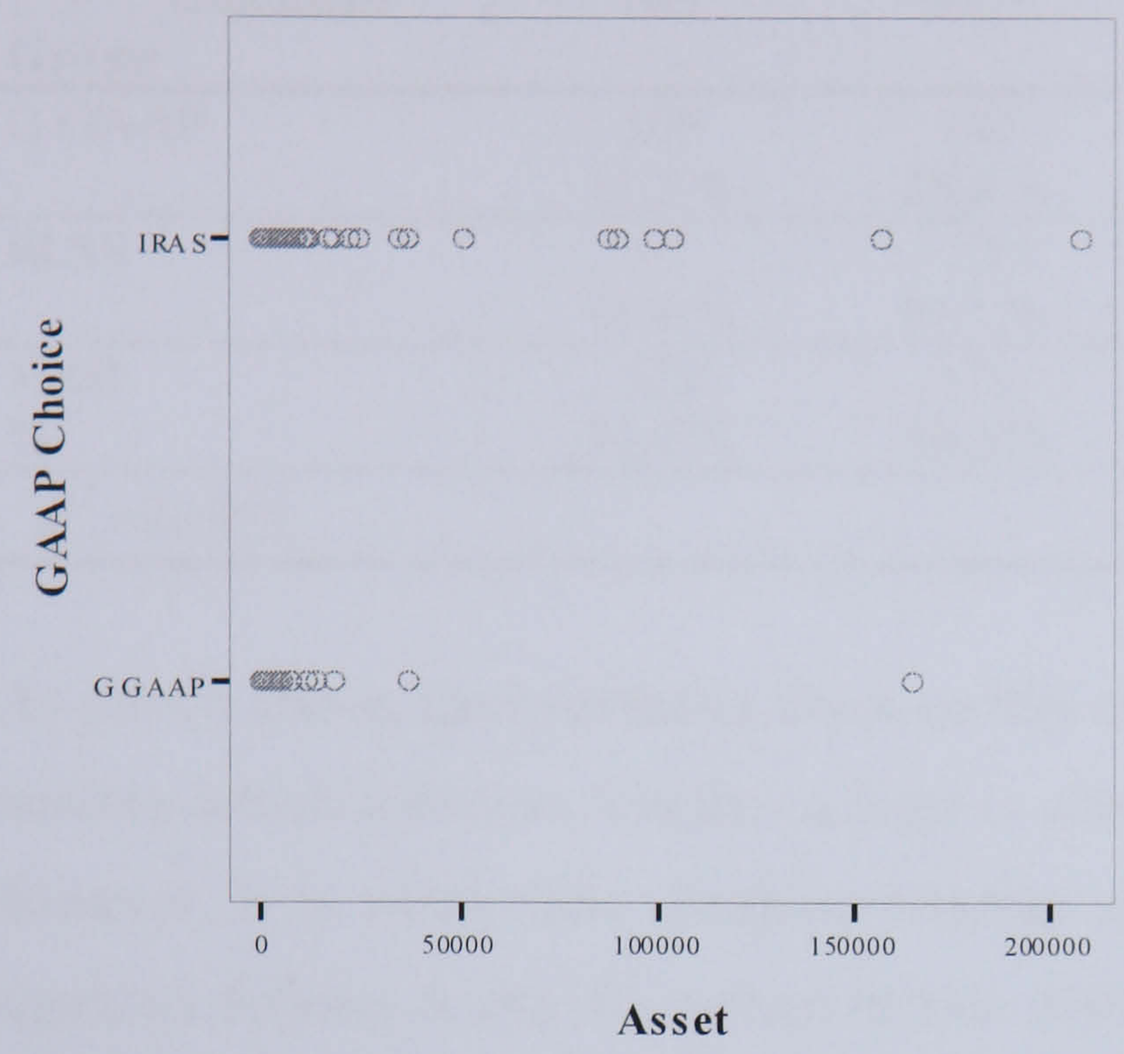

Figure 7.3: A scatterplot of total assets across IRAS and GGAAP groups

The direction of the relationship between size variables and the choice of IRAS or G GAAP is clearly shown through the proportional distribution in the contingency tables in Table 7.5. This distribution implies that the likelihood of complying with IRAS is positively related to size. However, the proportions of both IRAS and G GAAP companies in the category "Medium" are nearly equal. This raises a question about the linearity of this relationship. This is further investigated through the multivariable analysis and discussed in the discussion section at the end of this chapter.

7.4.1.2 Quality Segments:

Table 7.6 below investigates the relationship between quality segments in the Main market and the choice of GAAP.

This table shows that the vast majority of companies using IRAS are classified in quality segments (see Section 2.5.2.4.2). On the contrary, more than half the companies using G GAAP are not classified. This pattern of distribution suggests that a firm using IRAS is very likely to be a member of DAX, MDAX or SMAX. One can also state that a firm which is a member of a quality segment is more likely to be using IRAS. This statement is consistent with the alternative hypothesis stated earlier in Chapter 5 (see Table 7.35 at the end of this chapter).

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Table 7.6: Quality segments and the choice between GGAAP and IRAS

Classified Group	**NO**	**YES**	**Total**
G GAAP	105	100	205
	51.2 %	48.8 %	100 %
IRAS	17	73	90
	18.9 %	81.1 %	100 %
Total	122	173	295
%	41.4 %	58.6 %	
χ^2 =26.955			P= .000

As shown above, the hypothesis about quality segments is tested through the binary variable which indicates whether a firm is classified in a quality segment or not. However, it is worthwhile checking whether compliance with IRAS within these segments follows a specific pattern or not. Therefore, the relationship between the different segments and the GAAP choices is investigated through Table 7.7 below. Unlike the other tables in this chapter, percentages in this table are to be read vertically instead of horizontally.

In Table 7.7, interestingly, one can see that the percentages of firms using IRAS in SMAX, MDAX and DAX increase as we move to a higher segment. In other words, the percentage of IRAS companies in DAX is substantially larger than that in MDAX, which is in turn, substantially larger than that in SMAX. Furthermore, the percentage of IRAS firms in SMAX is larger than that in "Unclassified". To some extent this can be attributed to the size effect, which is positively correlated with quality segments.

Although Table 7.8 is presented to investigate the relationship between size of firms and their quality segments, a discussion of this relationship is postponed to the end of this chapter where it can be discussed in the light of the results of the multivariable analysis.

Table 7.7: Quality segments and the choice between GGAAP and IRAS

GAAP / Segment	**DAX**	**MDAX**	**SMAX**	**Unclassified**	**Total**
G GAAP	4	29	67	105	205
	18.2%	49.2%	72.8%	86.1%	69.5%
IRAS	18	30	25	17	90
	81.8%	50.8%	27.2%	13.9%	30.5%
Total	22	59	92	122	295
	100.0%	100.0%	100.0%	100.0%	100.0%

See Section 2.5.2.4.2 for definitions of segments

Table 7.8: Relationship between size and quality segments

Size[246] / Segment	DAX	MDAX	SMAX	Unclassified	Total
Large	20	18	0	7	45
	44.4%	40.0%	0.0%	15.6%	100.0%
Medium	2	30	17	30	79
	2.5%	38.0%	21.5%	38.0%	100.0%
Small	0	11	75	85	171
	0.0 %	6.4%	43.9%	49.7%	100.0%
Total	22	59	92	122	295
	7.5%	20.0%	31.2%	41.4%	100.0%

See Section 2.5.2.4.2 for definitions of segments

7.4.1.3 Leverage (OR-LEVER):

Leverage is one of the continuous variables which are categorized for the purpose of using contingency tables and chi-square. The descriptive statistics show that the mean leverage in the German Main Market firms is about 0.48 which may not be any higher than the average in many other countries[247]. In addition to that it shows that 25% of these firms have leverage of more than 0.63.

It can be seen Table 7.9, there are considerable differences in the distribution of firms in both the "High" and "Medium" categories. Companies using G GAAP have a larger proportion in the high category than firms using IRAS (14.1 % point difference[248]). In the medium category, conversely, IRAS firms have a larger proportion than that of the G GAAP firms (12.4 % point difference). These observations imply that G GAAP companies are more likely to have higher leverage than IRAS companies. Furthermore, the chi-square statistic suggests that the relationship between the levels of leverage in German firms is significantly linked with the choice of GAAP.

Reasons that may explain the inverse relationship between leverage and the choice of IRAS are fully discussed in Chapter5 where the hypothesis on leverage is postulated. This result leads to rejecting the null hypothesis as presented in Table 7.36 at the end of this the chapter.

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[246] Since differences between the categories of size variable are negligible, total assets is chosen here to represent size

[247] A conclusion by Rajan and Zingales (1995) indicating that Germany and the UK have the lowest leverage levels in the G7. (This is also indicated by Spremann and Gantenbein (2001))

[248] Remember that it is compared with difference of 10 % points, which is considered substantial.

Table 7.9: Categories of leverage and choice between GGAAP and IRAS

Leverage Group	Low < 0.358 Mio	Medium 0.358 – 0.648	High > 0.648	Total
G GAAP	58 28.3 %	93 45.4 %	54 26.3 %	205 100 %
IRAS	27 30.0 %	52 57.8 %	11 12.2 %	90 100 %
Total	85 28.8 %	145 49.2 %	65 22 %	295 100 %
χ^2 =7.682				P = .021

In the scatterplot shown below, it can be seen that at average leverage level of 0.65. there are more GGAAP than IRAS firms.

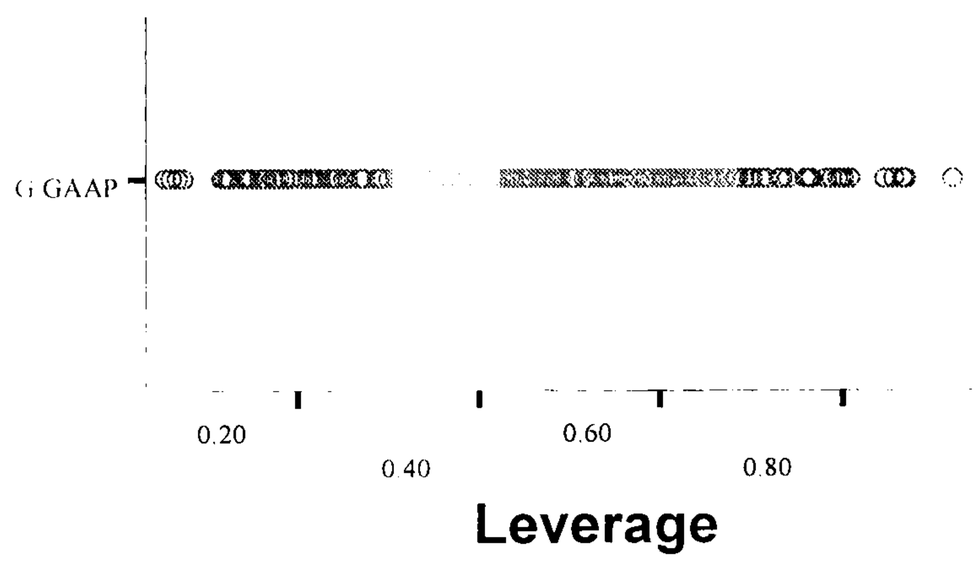

Figure 7.4: A scatterplot of leverage across IRAS or GGAAP groups

The inverse relationship between leverage and the choice of GAAP stated above raises the question about the relationship between size and leverage in German companies. As discussed in Chapter 5, leverage in German firms is expected to be negatively associated with size (unlike in other industrial countries). The Pearson`s coefficient in the correlation matrix shown in Table 7.4 above proves this. Furthermore, a crosstabulation between the categories of leverage and those of size was associated with a significant chi-square statistic at 0.05[249]. This finding is consistent with findings of Rajan and Zingales (2001) and with the finding that size

[249] The researcher thinks that there is no need to depict this table here.

is positively associated with the choice of IRAS. This particular relationship is discussed in Chapter 5. Yet, in short, some relate this to the special relationship between small and medium German firms and their banks.

7.4.1.4 Profitability:

Profitability is represented by two variables: PROFIT1 (profits to total assets) and PROFIT2 (profits to turnover) which are measured on a continuous scale. Table 7.10 presents crosstabulations between the GAAP groups and each of the two profitability variables. Table 7.10 below shows that, within the three levels of PROFIT1, differences between the proportions of the two GAAP groups are not important. In general, the two groups have the largest percentages classified as of "Low" profitability (< 6.3 %). The chi-square statistic implies an insignificant relationship between profitability and the choice of GAAP.

Unlike PROFIT1, the difference between the proportions of G GAAP and IRAS companies in the High category of PROFIT 2 is quite large (10.1 % points). However, the chi-square statistic is still small and insignificant. This simply indicates that there is no relationship between profitability (PROFIT2) and the choice of GAAP.

Table 7.10: Categories of profitability and choice between GGAAP and IRAS

	Unprofitable	**Low**	**High**	**Total**
PROFIT1	**< 0 %**	**0 % – 6.3 %**	**> 6.3 %**	
G GAAP	58	84	63	205
	28.3 %	41.0 %	30.7 %	100 %
IRAS	20	40	30	90
	22.2 %	44.4 %	33.3 %	100 %
Total	78	124	93	295
	26.4 %	42.0 %	31.5 %	
χ^2 =1.185				P = .553
PROFIT2	**< 0 %**	**0 % – 5.5 %**	**> 5.5 %**	
G GAAP	58	88	59	205
	28.3 %	42.9 %	28.8 %	100 %
IRAS	20	35	35	90
	22.2 %	38.9 %	38.9 %	100 %
Total	78	123	94	295
	26.4 %	41.7 %	31.9 %	
χ^2 =3.122				P = .210

Variables as defined below Table 7.4

7.4.1.5 Free Float

Table 7.11 below shows that, in both categories "High" and "Low", there are considerable differences between the percentages of G GAAP firms and IRAS firms. At the medium level, on the other hand, the difference is very small. Within the companies categorized as of low free float, G GAAP firms seem to have a considerably larger proportion than that of IRAS firms. Conversely, under the category "High", IRAS firms seem to have substantially larger proportion than that of G GAAP firms. The chi-square statistic is significant at .05, which indicates a significant relationship between free float and accounting choices.

Table 7.11: Categories of free float and choice between GGAAP and IRAS

OR-FRFLOAT **Group**	**Low** **< 21.2 %**	**Medium** **21.2 – 43.6 %**	**High** **> 43.6**	**Total**
G GAAP	74 36.1 %	82 40.0 %	49 23.9 %	205 100 %
IRAS	20 22.2 %	38 42.2 %	32 35.6 %	90 100 %
Total	94 31.9 %	120 40.7 %	81 27.5 %	295
χ^2 =6.948				P = .031

Variables as defined below Table 7.4

7.4.2 Crosstabulation for nominal and binary variables:

7.4.2.1 Auditor identity (AUDID):

From Table 7.12, it seems that the majority of companies using IRAS are audited by Big-5 firms. G GAAP firms, in contrast, are nearly equally split between Big-5 firms and other auditors. This makes the percentage of G GAAP audited by other than Big-5 auditors substantially larger than that of IRAS companies (47.3 %; 26.7 % respectively).

The significance of the chi-square statistic at 0.001 indicates a significant relationship between auditor choice and GAAP choice.

Table 7.12: Having Big-5 auditors choice between GGAAP and IRAS

GAAP / Big-5	**YES**	**NO**	**Total**
G GAAP	108 52.7 %	97 47.3 %	205 100 %
IRAS	66 73.3 %	24 26.7 %	90 100 %
Total %	174 59 %	121 41 %	295
χ^2 =11.024			P= .001

Variables as defined below Table 7.4

Based on the assumption that firms audited by Big-5 auditors are very likely to be the largest, it is worthwhile checking whether the relationship between auditor choice and the choice of IRAS or G GAAP is confounded by the effect of size. Therefore, Table 7.13 presents a crosstabulation between the categories of size and auditor type.

Although the vast majority of large firms are audited by Big-5 auditors (38/45= 84.4 %), the majority of firms audited by Big-5 are classified as "Small". Furthermore, small firms are split in nearly two equal proportions (83/171; 88/171) over the two types of auditors. Although the relationship is significant according to the chi-square test, further analysis shows that 22 (25 %) firms of small firms with Big-5 auditors and 33.3 % of medium firms with Big-5 auditors are using IRAS. This indicates that the relationship between the type of auditor and choosing IRAS is separate from the size effect. It also shows that the Big-5 had deep penetration of the market for the audit of listed companies.

Table 7.13: Categories of size and the choice of auditors

Big-5 / Size	Small	Medium	Large	Total
NO	83	31	7	121
	68.6 %	25.6 %	5.8 %	100.0 %
YES	88	48	38	174
	50.6 %	27.6 %	21.8 %	100.0 %
Total	171	79	45	295
	58.0 %	26.8 %	15.3 %	100.0%
$\chi^2 = 16.160$				P = .000

Size variable is TOASSET (total assets)

7.4.2.2 Listing status:

As explained in previous chapters, not many German firms are listed abroad. From the 42 firms listed abroad, only 30 firms belong to the target sample of this study (excluding 7 non-financial firms and 5 Neuer Markt firms[250]).

About 76 % of multi-listed companies use IRAS. Table 7.14 below shows the proportional differences between G GAAP group and IRAS group are substantial. It can be seen that the percentage of IRAS firms listed abroad is considerably higher than that of G GAAP firms. Furthermore, the result of the chi-square test seems to be highly significant. This result confirms a significant relationship between listing status and the choice of IRAS or G GAAP. The distribution in Table 7.14 indicates

[250] The number in Table 7.14 is 29 because Infineon Technologies AG, which is listed on NYSE is excluded because it is owned by Siemens AG (50.9%).

that firms using IRAS are more likely to be listed on foreign exchanges than those using G GAAP. Still the most of IRAS companies are not multi-listed simply because, in general, the percentage of German firms listed abroad is very small.

Table 7.14: Listing Status and choice between GGAAP and IRAS

GAAP/Listing abroad	**NO**	**YES**	**Total**
G GAAP	198	7	205
	96.6 %	3.4 %	100 %
IRAS	68	22	90
	75.6 %	24.4 %	100 %
Total	266	29	295
%	90.2 %	9.8 %	100 %
χ^2 =31.204			P= .000

As with the different variables tested above, it is important to investigate whether the size factor has a strong influence on the relationship. A crosstabulation between size categories and listing status shows that a substantial majority (80 %) of the multi-listed firms are classified as "Large", whereas only one firm is classified as "Small". This may in fact undermine the hypothesis of listing status. Multivariable analysis presented later in this chapter can provide useful information on this.

7.4.2.3 Management ownership:

Variables on management ownership indicate whether managers, either on the supervisory board or the executive board, hold shares in the company or not. Although the three management variables are assumed to have different information content, Table 7.15 shows that proportional distributions of G GAAP and IRAS companies are similar across the groups of MAN1, MAN2 and MAN3[251]. For example, in the three variables, firms that have management ownership are equally split between using G GAAP or IRAS. The results show that the relationship between the three variables and the choice of GAAP is insignificant.

[251] Crosstabulations and chi-square results of MAN2 and MAN3 are nearly identical, so that they are presented as one variable.

Table 7.15: Management ownership and choice between GGAAP and IRAS

GAAP / MAN1	**YES**	**NO**	**Total**
G GAAP	63	142	205
	30.7 %	69.3 %	100.0 %
IRAS	30	60	90
	33.3 %	66.7 %	100.0 %
Total	93	202	295
%	31.5 %	68.5 %	100.0 %
$\chi^2 = 0.197$			P = .658
MAN2, MAN3	**YES**	**NO**	**Total**
IRAS	87	118	205
	42.4 5	57.6 %	100.0 %
G GAAP	37	53	90
	41.1 %	58.9 %	100.0 %
Total	124	171	295
%	42.0 %	58.0 %	100.0 %
χ^2 =0.045			P= .832

Variables as defined below Table 7.4

7.4.2.4 Foreign subsidiary (FOR-SUB):

This variable studies the effect of having a subsidiary abroad. A significant percentage of German Main Market companies (65 %) have subsidiaries abroad.

The percentage of firms having a subsidiary abroad is high in the two groups. However, it is substantially higher for the group of firms using IRAS.

The chi-square statistic indicates a significant relationship between having a subsidiary abroad and the choice of GAAP. German companies that have subsidiaries abroad are significantly more likely to comply with IRAS.

Finally, the proportional structure in Table 7.16 suggests that firms using IRAS are more likely to have a subsidiary abroad.

Table 7.16: Business abroad and choice between GGAAP and IRAS

Foreign subsidiaries **Group**	**NO**	**YES**	**Total**
G GAAP	52	153	205
	25.4 %	74.6 %	100 %
IRAS	9	81	90
	10.0 %	90.0 %	100 %
Total	61	234	295
%	20.7 %	79.3 %	
χ^2 =9.003			P= .003

7.4.2.5 Foreign Investors (FORINVES):

This variable indicates whether "significant" foreign investors hold a part in a company's equity capital or not (see Chapters 5 and 6).

Table 7.16 depicts that there are no important proportional differences in using IRAS and G GAAP between firms with and without significant foreign investors. For example, the percentage of G GAAP firms that have foreign investors is not very different from that of IRAS firms (4.3 % point).

The relationship between the existence of foreign investors and the choice of IRAS or G GAAP is not significant as indicated by chi-square statistic shown at the end of Table 7.17.

Table 7.17: Foreign investors and choice between GGAAP and IRAS

Foreign investors Group	**NO**	**YES**	**Total**
G GAAP	150 73.2 %	55 26.8 %	205 100 %
IRAS	62 68.9 %	28 31.1 %	90 100 %
Total %	212 71.9 %	83 28.1 %	295
χ^2 =0.567			P= .451

7.4.2.6 Foreign management:

This variable indicates whether there are foreign members on the supervisory board or the executive board.

Within the Main Market amongst firms that have foreign board members, the proportion of companies using IRAS is considerably higher than that of those using G GAAP.

According to the chi-square test, the relationship between the existence of foreign managers and the choice of IRAS or G GAAP is significant at 0.01. Furthermore, the distributional differences imply that companies using IRAS are more likely to have foreign managers.

Table 7.18: Foreign managers and choice between GGAAP and IRAS

Foreign managers **Group**	**NO**	**YES**	**Total**
G GAAP	144	61	205
	70.2 %	29.8 %	100 %
IRAS	49	41	90
	54.4 %	45.6 %	100 %
Total	193	102	295
%	65.4 %	34.6 %	100 %
χ^2 =6.902			P= .009

7.4.2.7 Industry variables:

It should be remembered that the industry variables are treated as either nominal variables (2 variables) or binary variables (8 variables). Crosstabulations below use these two variables. ***INDUS1:*** This nominal variable includes 5 categories of industries. Table 7.18 shows that large proportional differences in GAAP choice exist in two categories: Manufacturing (MANUF1) and Pharmaceuticals and Chemicals (P&C). Both groups IRAS and G GAAP companies have their largest proportion classified as "Manufacturing". However, within this particular category the proportion of G GAAP firms is larger than that of IRAS firms. On the other hand, in the category "P&C" the proportion of IRAS firms is larger than that of G GAAP firms (still, the difference may not be substantial).

The chi-square test shows that the relationship between industry classification and the choice of GAAP is significant. This relationship is further investigated by running a crosstabulation for each of the industry binary variables with the accounting standards choice (not presented here). Whereas being in PANDC (P&C) is significantly related with choosing IRAS at 0.05, being in the UANDT (U&T) is marginally significant with choosing IRAS at 0.10 (this will be discussed at the end of this chapter).

Table 7.19: Industry sectors (as defined below Table 7.4) and choice between GGAAP and IRAS

INDUS 1 **Group**	**U & T**	**MANUF1**	**P & C**	**TRAD1**	**TECHNO**	**Total**
G GAAP	9	97	16	61	22	205
	4.4 %	47.3 %	7.8 %	29.8 %	10.7 %	100 %
IRAS	9	34	15	20	12	90
	10.0 %	37.8 %	16.7 %	22.2 %	13.3 %	100 %
Total	18	131	31	81	34	295
χ^2 =10.841						P= .028

INDUS2:

This is a nominal variable which aggregates the industry sectors to a smaller number of categories [252] : Utilities and Transportation (U&T). Manufacturing and Pharmaceuticals and chemicals (P&C).

Table 7.20 below does not show important differences between the two groups of firms within MANUF1 and P&C. In the U&T the proportional difference seems to be quite large, although it is not substantial.

Moreover. the result of the chi-square test indicates that the relationship between being in any of these industry groups and choosing IRAS or G GAAP is not significant.

Table 7.20: Industry sectors (INDUS2) and choice between IRAS and GGAAP

INDUS2 Group	**SERVIC**	**MANUF1**	**P & C**	**TRAD1**
G GAAP	27	117	61	205
	13.2 %	57.1 %	29.8 %	100 %
IRAS	20	50	20	90
	22.2 %	55.6 %	22.2 %	100 %
Total	47	167	81	295
	15.9 %	56.6 %	27.5 %	100 %
$\chi^2 = 4.534$				P= .104

Variables as defined below Table 7.4

7.5 Student t-test for independent samples:

As explained in Chapter 6, the t-test is run for all the variables across the two groups. IRAS and G GAAP (two independent samples) regardless of the violation of the related assumptions[253].

[252] Utilities and Pharmaceuticals (U&T), Manufacturing (MANUF2) and Pharmaceuticals and Chemicals (P&C)

[253] Although the main assumptions are the normality and the equality of variances, it is agreed that the t-test is robust to the normality assumption (see Bryman and Cramer, 2001). (see also footnote 246)

Table 7.21: t test for independent samples (GGAAP and IRAS)

Variable	Mean difference[254]	Equal variance assumed[255]		Not assumed		Variances test[256]	95% confidence interval of the mean difference	
		T value	P value[257]	t value	t value	Not equal		
EMPNO (-)[258]	-34874	-5.506	**.000**	-3.806	**.000**	Not equal	**-53055**	**-16693**
TOASSET (-)	-10792	-4.101	**.000**	-2.999	**.002**	Not equal	**-17932**	**-3653**
TURNOV (-)	-8680	-5.154	**.000**	-3.515	**.001**	Not equal	**-13585**	**-3775**
LEVER (+)	0.026	1.028	.153	1.060	.146	Equal	-0.024	0.076
FRFLOAT (-)	-0.094	-2.861	**.002**	-2.784	**.003**	Equal	**-0.158**	**-0.029**
PROFIT1 (-)	-0.013	-0.577	.283	-0.624	.257	Equal	-0.059	0.032
PROFIT2 (-)	-0.187	-0.501	.313	-0.684	.246	Equal	-0.926	0.550
Variables transformed in logarithmic form:								
LNEMPNO	-1.288	-4.944	**.000**	-4.420	**.000**	Not equal	**-1.864**	**-0.712**
LNTOASSET	-1.440	-6.057	**.000**	-5.121	**.000**	Not equal	**-1.997**	**-0.883**
LNREVEN	-1.453	-5.754	**.000**	-4.972	**.000**	Not equal	**-1.964**	**-0.428**
LNFRFLOAT	-0.947	-1.861	**.032**	-2.072	**.014**	Not equal	**-1.847**	**-0.047**
Variables after removing outliers:								
EMPNO	-3924	-3.416	**.000**	-2.850	**.002**	Not equal	**-18715**	**-6447**
TOASSET	-861	-4.869	**.000**	-3.536	**.000**	Not equal	**-5587**	**-1641**
TURNOV	-777	-3.526	**.000**	-2.856	**.000**	Not equal	**-4286**	**-1296**
FREFLOAT	-0.09	-2.861	**.004**	-2.784	**.003**	Equal	**-0.144**	**-0.024**
PROFIT1	-0.012	-1.060	.145	-1.056	.146	Equal	-0.033	0.014
PROFIT2	-0.013	-1.078	.141	-1.075	.142	Equal	-0.097	0.018
Variables tested informally (explained later below):								
MAN1 (+)	**.000**	Not equal	.374	-0.320	.375	Equal	-0.057	0.041

[254] This is the difference in the mean of each variable across the two groups GGAAP and IRAS (mean of GGAAP group – mean of IRAS group).
[255] Equality of variances is an assumption for the t-test. However, SPSS provides us with results under two conditions (equal variances assumed- not assumed)
[256] Results of Levene's test for the equality of variances
[257] The significance showed in this table is 1-tailed test because the hypotheses are directional.
[258] The expected signs for the mean differences are in parentheses (GGAAP-IRAS)

MAN2 (+)	**.000**	Not equal	.148	1.127	.131	Not equal	-0.027	0.100
MAN3 (+)	**.014**	Not equal	.326	0.467	.321	Equal	-0.056	0.089
FORINVS (-)			.367	-0.356	.361	Equal	-0.056	0.080
LNMAN1	**.002**	Not equal	.331	-0.433	.333	Equal	-2.061	1.311
LNMAN2	**.000**	Not equal	.387	0.290	.386	Equal	-1.567	2.106
LNMAN3	**.000**	Not equal	.471	0.073	.471	Equal	-1.797	1.935
LNFORINV	**.003**	Equal	.263	-0.631	.265	Equal	-2.220	1.134

Note: **bold** typeface in the P value column indicates a statistically significant difference at the 0.05 level. However, emboldened confidence intervals are those which indicate that direction of the difference is stable (either + or -, but not both).
Variables as defined below Table 7.4

Results show that mean of the three size variables and the free float variable (FREFLOAT) is larger in IRAS companies than in GGAAP companies. The confidence interval for each of these variables indicates that one can be 95% confident about direction of these differences.

On the other hand, in terms of leverage and profitability variables, the confidence intervals shown in Table 7.21 indicate that we cannot be sure about the differences across these variables because contain both positive and negative sign. In other words, we can not be sure about the direction of the differences in the population.

The robustness of these results is confirmed by removing outliers once and by transforming data to natural logarithm values in another[259].

Variables tested informally: as explained earlier, the variables MAN1, MAN2, MAN3 and FORINVES are transformed into a binary form because of the large number of zero frequency. They are examined informally as continuous variables using all the statistical tests presented in this chapter, so that results can be compared with those of testing them as binary variables. No significant results are observed, however (see Table 7.22).

7.6 Mann-Whitney:

This test is the non-parametric equivalent of the t-test. Because all the variables except leverage are not normally distributed this test may be more appropriate (see Chapter 6[260]). The results of this test shown in Table 7.22 show that differences in terms of size, profitability (PROFIT2) and free float are significant at .05. Except for the result on profitability, these results confirm those obtained by the t-test.

Table 7.22: Results of Man-Whitney for GGAAP and IRAS

Variable	Z value	P value (1-tailed)
EMPNO	-4.397	.000
TOASSET	-4.807	.000
TURNOV	-4.388	.000
PROFIT1	-0.792	.215
PROFIT2	-1.834	.034
FREFLOAT	-2.736	.003

Variables as defined below Table 7.4

[259] Still, these transformations did not result normal distributions.

[260] Chapter 6 (about research design) explains that the parametric tests are robust to the normality assumption and that they can be used next to the non-parametric tests.

7.7 Differences between the three groups: G GAAP, IAS and US GAAP in the Main Market:

This section examines differences between the three groups of companies using G GAAP, IAS or US GAAP in terms of size, free float, leverage and profitability. Although Chapter 8 is devoted to analysing the choice IAS and US GAAP, this section is useful to compare the characteristics of G GAAP, IAS and US GAAP Main Market companies separately.

7.7.1 ANOVA:

Table 7.23, shows that there are overall significant differences between the three groups: IAS, US GAAP and G GAAP in terms of size and free float. On the other hand, overall differences between these groups are not significant in terms of profitability and leverage. Furthermore, confidence intervals of these significant differences indicate that we can be fairly confident about the direction of these differences.

Multiple comparison tests (explained in Chapter 6) show that in terms of employee numbers, total assets and turnover companies using US GAAP are significantly larger than those using IAS, which are, in turn, significantly larger than G GAAP firms. Confidence intervals which are depicted for each of these differences indicate the stability of the significant differences.

Yet, excluding outliers in further analysis shows that US GAAP group and IAS group are not significantly different in size; nevertheless each of them is still significantly larger than G GAAP firms.

Furthermore, results in Table 7.23 show that there is an overall significant difference between the three groups in terms of free float. However, multiple comparisons show that difference between the IAS and G GAAP group is not significant. Results show that percentages of free float in US GAAP firms are, on average, larger than those in companies using IAS or G GAAP. IAS firms, in turn, have larger proportions of free float than G GAAP firms, although the difference is insignificant.

ANOVA results and multiple comparisons do not show any significant differences between the three groups in terms of leverage and profitability. Although differences are not significant, they indicate that IAS firms are more profitable than those using US GAAP, which are in turn, less profitable than G GAAP companies. According to

the hypotheses on profitability, IAS are expected to have more profitability than G GAAP firms but not more than US GAAP firms.

In terms of leverage, differences seem to be trivial, although, in general, G GAAP firms have higher leverage than those using IRAS. Although this result is not significant, it is consistent with the expectation of the leverage hypothesis.

Transforming variables into logarithmic form does not result in significant size differences between companies using US GAAP and those using IAS. However, differences are still significant between each of the IRAS groups and G GAAP group[261]. Moreover, as a result of this transformation, free float differences became insignificant.

[261] Still, US GAAP firms are insignificantly larger (P value of .103) than G GAAP firms.

Table 7.23: Results of ANOVA between the Groups IAS. US GAAP and GGAAP

Variable	Variances Equality[262]	ANOVA		Multiple comparisons: Tukey HSD test[263] (Mean differences and significance)			95% Confidence Interval for mean differences		
		F value	Sig.[264]	IAS - GGAAP	IAS - USGAAP	USGAAP – GGAAP	IAS - GGAAP	IAS - USGAAP	USGAAP - GGAAP
EMPNO	Not equal	19.223	**.000**	**26514.4**	**-32710.3**	**59224.7**	**10089: 42940**	**-60918 :-4503**	**33558-84891**
TOASSET	Not equal	11.525	**.000**	**7682.4**	**-12169.5**	**19851.9**	**840: 14525**	**-23920: -419**	**9159: 30544**
TURNOV	Not equal	19.245	**.000**	**5995.7**	**-10503.3**	**16499.0**	**1654: 10337**	**-17959: -3048**	**9715: 23283**
LEVER	Equal	0.540	.583	-0.024	0.008	-0.032	-0.091: 0.043	-0.107: 0.123	-0.137: 0.072
PROFIT1	Equal	1.139	.322	0.029	0.062	-0.033	-0.032: 0.090	-0.043: 0.166	-0.127: 0.062
PROFIT2	Equal	0.415	.661	0.324	0.552	-0.228	-0.655: 1.304	-1.158: 2.262	-1.789: 1.334
FRFLOAT	Equal	7.370	**.001**	0.054	**-0.157**	**0.211**	-0.032: 0.139	**-0.303: -0.011**	**0.078: 0.344**
Variables transformed into logarithmic form									
LNEMPNO	Not Equal	13.002	**.000**	**1.131**	-0.613	**1.744**	**0.449: 1.814**	-1.784: 0.559	**0.678: 2.810**
LNASSET	Not Equal	20.576	**.000**	**1.207**	-0.913	**2.119**	**0.587: 1.827**	-1.977: 0.152	**-3.088: -1.151**
LNTUROV	Not Equal	7.786	**.001**	**1.235**	-0.882	2.117	**0.439: 2.032**	-1.214: 1.522	-0.163: 2.326
LNFREFLO	Not Equal	1.797	.168	0.853	-0.366	1.219	-0.032: 0.139	**-0.303: -0.011**	**0.078: 0.344**
LnPROFIT1[265]	Equal	0.218	.804	0.001	0.001	-0.001	-0.032: 0.090	-0.043: 0.166	-0.127: 0.062
Variable after excluding the outliers[266]									
EMPNO	Not equal	5.887	**.003**	**3722.5**	-855.4	**4577.8**	**7643: 18997**	-7120: 13497	**684: 19578**
TOASSET	Not equal	13.133	**.000**	**724.6**	-562.4	**1287.1**	**1620: 5331**	-3900: 2735	**1024: 7092**
TURNOV	Not equal	7.287	**.001**	**623.4**	-639.8	1263.2	**1537: 4426**	-1800: 3446	-246: 4563
PROFIT1	Equal	.336	.715	0.013	0.004	0.009	-.021: 0.040	-0.056: 0.054	-0.039: 0.061

Note: **bold** typeface indicates a statistically significant difference at the 0.05 level. Emboldened confidence intervals indicate stable direction of differences.

[262] Tests were rerun without the assumption of variance equality (an option in SPSS), the results were robust to this assumption.
[263] Tukey HSD is a Post Hoc test used to make pairwise comparisons because ANOVA does not provide this type comparison. It only tells as whether significant differences exist between groups (see Chapter 6).
[264] The probability of getting such results if differences do not exist (if the null hypothesis is right)
[265] Results of PROFIT1 and PROFIT2 are not very different from each other, therefore, only one of them it is presented.
[266] Results for leverage and free float are not presented because they did not change by excluding outliers.

7.7.2 Kruskal-Wallis

As explained in Chapter 6, this test is the non-parametric alternative to ANOVA. Results shown in Table 7.24 are fairly consistent with those obtained by ANOVA, although the differences in size variables across the IAS group and US GAAP group are insignificant, even without excluding outliers (because in ANOVA results, they only become insignificant by removing outliers). As with the results of ANOVA, excluding outliers, results in insignificant size differences.

Table 7.24: Results of Kruskal-Wallis between GGAAP IAS and US GAAP

Variable	**Kruskal-Wallis**		**Significance of pairwise comparisons**[267]					
	Chi-square[268]	Sig.	IAS &G GAAP		IAS & US GAAP		US GAAP & G GAAP	
EMPNO	20.592	**.000**	11.773	**.001**	0.971	.325	12.206	**.000**
TOASSET	25.674	**.000**	12.782	**.000**	1.913	.167	17.213	**.000**
TURNOV	20.940	**.000**	11.269	**.001**	1.480	.224	13.047	**.000**
LEVER	1.471	.479	0.959	.327	0.002	.967	0.778	.378
PROFIT1	0.640	.726	0.627	.429	0.002	.967	0.093	.760
PROFIT2	3.381	.184	2.931	.087	0.020	.887	0.857	.355
FRFLOAT	11.511	**.003**	2.634	.105	4.971	**.026**	9.795	**.002**

Note: **bold** typeface indicates a statistically significant correlation at the 0.05 level.
Variables as defined below Table 7.4

[267] These comparisons were run in a different way from that used in ANOVA. This was by defining just two groups each time the test is run.
[268] This is the statistic produced by Kruskal-Wallis test

7.8 Results of multivariable analysis:

Introduction to the technique multivariable analysis is provided in Chapter 6. Results of Multivariable logistic regression can be presented in the form of a full model which include all the variables suggested by the theoretical hypotheses. or in the form of a constructed model. Therefore, the researcher chose to present both options. However, there are a few considerations which should be highlighted before continuing with the multivariable analysis and the modelling process.

7.8.1 The number of predictors:

Before proceeding with the process of modeling, it is important to emphasize that problems may occur when the number of predictors is too large. Peduzzi et al (1996, p.1379) state that "the validity of the logistic model becomes problematic when the ratio of the numbers of events per variable analyzed becomes small. The parameter estimates may be biased and the usual tests of significance may not be valid". They discuss three possible types of error: "overfitting" (too many variables of which some may cause noise), "underfitting" (omitting important variables) and "paradoxical" fitting (incorrect direction of association). There is an agreement on a rule of thumb for the number of EPV (events per variable) between Peduzzi et al (ibid) and Harrell et al (1996). Agresti (2001, p212) explains this rule by the following: "if y = 1 only 30 times out of n =1000, for instance, the model should contain no more than about three x terms"[269]. That is if the number of events is 30 (number of companies using IRAS 'y'), the number of independent variables (x terms) should not be more than 3 regardless the size of the sample (even if it was 1000 companies). Other arbitrary rules are suggested in the literature[270]. The first rule seems to be the most conservative one. According to this rule the sample of the main market allows us to have a maximum of 10 independent variables.

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[269] Agresti (ibid) reports that this is approximate and does not mean that one can have 50 variables if they have 500 outcomes of each type.

[270] The number of observations should be 30 times the number of predictors (in the case of my study, this gives the same result as the one stated above). Another rule is to have a predictor for each 10 cases (Garson, ncsu, 2004)

7.8.2 Significance for the Wald test for coefficients[271]:

There is no agreement between statisticians on the level of significance required to leave predictors in a multiple model (Menard 1995, 2001). It is even possible to leave variables whose coefficients are not significant in a model if they are "important control variables" [272] (Hosmer and Lemeshow 2000, p106). For the purpose of this study, the significance of the predictors was not the primary consideration. One should also remember that many of the hypotheses in this research are "unidirectional". This means that one can consider half the P value given in the output for coefficients of these variables representing such hypotheses.

7.8.3 Categorization of size variables:

The researcher chose to categorize the size variables which are highly skewed for three reasons[273]: the number of outliers within the size variables is large[274]. Gujarati (2003) claims this can distort the regression line. He also argues that if outliers are genuine[275], one should not reject them. Categorization can help by isolating the outliers in a separate category[276]. Furthermore, measuring size in terms of turnover or total assets can be influenced by the GAAP used (the dependent variable). The employee number, in turn, can be affected by the type of industry. Therefore, categorization is suggested for neutralizing the bias in these measures. Finally, these variables showed as non-linear in the logit[277]. Norusis (2001) suggests that if the relationship between predictors and logit is non-linear, categorization may be used to investigate such relationships. Streiner (2002, p.262) also concludes that "dichotomizing a continuous variable is justified only when the distribution of that variable is highly skewed or its relation with another variable is non linear".

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[271] The significance for coefficients is calculated for the Wald test statistic which is $(\beta / SE)^2$

[272] Deciding which variables are important for the model is judgmental.

[273] Arguments against this were illustrated earlier in this chapter. These justifications are here to signify that the researcher is aware of the reservations some statisticians have about such procedures.

[274] They are calculated by the formula illustrated earlier in this chapter

[275] Do not result from errors in the process of data entry

[276] This was suggested by Professor John Matthews in a meeting with the researcher in the Schools of Mathematics and Statistics at the University of Newcastle.

[277] Linearity in the logit is a main assumption for the logistic model. Testing for linearity was achieved by using Box-Tidwell and polynomial regression. Modelling this linearity by adding quadratic terms did not give satisfactory results (the process of modelling was done under supervision from Professor Jim Jaccard from "State university of New York" via email)

7.8.4 Univariable models:

Univariable models are run for all the independent variables to see how each of them works as a predictor without holding the other variables constant. Results presented in Table 7.25 below can also be useful in building a model by helping us to choose which variables should be in the model in the first step of modelling (see explanation of purposeful selection below).

Table 7.25: Results of univariable models for all variables

	B	S.E.	Wald	Sig.	Exp(B)	95.0% C.I.	
Continuous variables:							
SEMPNO	**.026**	.007	13.489	**.000**	1.027	1.012	1.041
SASSETS	**.037**	.015	6.641	**.010**	1.038	1.009	1.068
STURNOV	**.104**	.030	12.298	**.000**	1.109	1.047	1.176
LEVERAGE	-.649	.632	1.056	.304	.522	.151	1.802
PROFIT1	.431	.749	.331	.565	1.538	.355	6.676
PROFIT2	.030	.065	.221	.639	1.031	.908	1.171
FREFLOAT	**1.348**	.483	7.805	**.005**	3.850	1.495	9.913
Dummy variables							
F_SUB	**1.118**	.386	8.372	**.004**	3.058	1.434	6.518
SEGMENTE	**1.505**	.303	24.629	**.000**	4.506	2.486	8.165
AUDITOR	**.904**	.276	10.702	**.001**	2.470	1.437	4.245
L_S	**2.183**	.488	19.994	**.000**	8.876	3.409	23.11
FORINVS2	.208	.277	.566	.452	1.232	.716	2.119
FORMANG	**.681**	.261	6.800	**.009**	1.975	1.184	3.295
BIMAN1	.120	.270	.196	.658	1.127	.664	1.913
BIMAN2	-.055	.257	.045	.832	.947	.573	1.566
BIMAN3	-.012	.254	.002	.962	.988	.601	1.625
Industry variables (categorical)							
INDUS1[278]			10.407	**.034**			
INDUS1(1)[279]	**1.115**	.537	4.309	**.038**	3.050	1.064	8.742
INDUS1(2)	.067	.326	.042	.838	1.069	.565	2.024
INDUS1(3)	**1.051**	.442	5.644	**.018**	2.859	1.202	6.803
INDUS1(4)	.509	.442	1.327	.249	1.664	.700	3.955
INDUS2			4.446	.108			
INDUS2(1)	**.815**	.392	4.330	**.037**	2.259	1.048	4.868
INDUS2(2)	.265	.308	.740	.390	1.303	.713	2.384

Note: **bold** typeface indicates a statistically significant coefficient at the 0.05. The dependent variable is given 0 for GGAAP and 1 for IRAS.
Variables as defined below Table 7.4

7.8.5 Full model:

As explained in section 7.8.1, a multivariable model in this study should have a maximum of 10 independent variables. However, a full model which includes all the

[278] Significance in some of the categories may and may not be reflected in the overall significance
[279] INDUS1(1), (2), (3) and (4) are: Utilities and Transportation, Manufacturing, Pharmaceutical and Chemicals, Technology and Trading (respectively).

variables suggested by the hypotheses is useful to show how the whole set of all of them works together. Still, we need to consider the fact that it is meaningless to include some variables in the same model because they proxy for the same thing, such as the three size variables and management ownership variables. Having variables which are highly correlated with each other results in multicollinearity, which can lead to inaccurate results (see below). The full model presented below include only one size variable which is categorised employees' number (OREMPNO)[280]. The management ownership variable MAN1[281] is quiet different from MAN2 and MAN3, which are highly correlated with each other. Therefore, MAN1 and only one of the other two variables are included in the model.

While Table 7.26 presents a full model with only one size variable, one profitability variable and two management ownership variables, Appendix 10.5 shows the other possible models which include the variables excluded here.

Table 7.26: A full model with all the variables

	B	S.E.	Wald	Sig.	Exp(B)	95.0% C.I.EXP(B)	
LEVERAGE	-0.820	0.806	1.035	0.309	0.440	0.091	2.138
PROFIT1	-0.165	0.808	0.042	0.838	0.848	0.174	4.134
FREFLOAT	-0.125	0.693	0.033	0.857	0.882	0.227	3.434
SEGMENT	1.330	0.395	11.330	**0.001**	3.780	1.743	8.200
F_SUB	0.414	0.439	0.891	0.345	1.514	0.640	3.578
AUDID	0.748	0.317	5.566	**0.018**	2.114	1.135	3.936
L_S	0.534	0.591	0.816	0.366	1.705	0.536	5.425
FORINVS2	0.218	0.393	0.306	0.580	1.243	0.575	2.687
FORMAN	0.504	0.365	1.907	0.167	1.656	0.809	3.387
INDUS2			3.206	0.201			
INDUS2(1)[282]	0.697	0.471	2.194	0.139	2.008	0.798	5.054
INDUS2(2)	-0.027	0.354	0.006	0.939	0.973	0.486	1.950
OREMPNO			9.930	**0.007**			
OREMPNO(High)	1.763	0.559	9.930	0.002	5.829	1.947	17.447
OREMPNO(Mid)	0.395	0.357	1.224	0.269	1.484	0.737	2.986
MAN1	1.535	0.885	3.004	**0.083**	4.639	0.818	26.307
MAN3	0.080	0.672	0.014	0.905	1.083	0.290	4.043
Constant	-3.020	0.714	17.916	0.000	0.049		
Model Chi-square: 74.076 (Sig: .000)				-2 Log Likelihood = 288.840			

Note: **bold** typeface indicates a statistically significant coefficient at the 0.05. The dependent variable is given 0 for GGAAP and 1 for IRAS.
Variables as defined below Table 7.4

[280] The reduced model constructed later includes total assets (ORASSET). Therefore, employees' number is presented here to show how both variables can have similar results.
[281] The one which does not consider family ownership as management ownership
[282] INDUS2(1)= Services (SERVIC2) whereas INDUS2(2)=Manufacturing (MANUF2)

According to the results represented in Table 7.26. only three variables SEGMENT, AUDID and OREMPNO are significant at 0.05. whereas another variable MAN1 is marginally significant at 0.1. Further discussion on the relationship between the independent variables can be found in the following sections. The confidence intervals of the odds ratio which clearly include the value 1 imply overfitting and the need to a model with a smaller number of predictor.

Statistics on the goodness of fit of this model will be presented below when compared with those of the constructed model (Main Model).

7.8.6 Main Model (constructed model):

The main aim of having a model with selected variables is to avoid overfitting which result in unreliable estimated coefficients. Variable selection and building models can be a complicated process. Experts in the field of logistic regression suggest different schemes to build a multiple regression model. According to Agresti (2002, p 212), "many model selection procedures exist, no one of which is always best". Hosmer and Lemeshow (2000, p91) state that "clear and careful thought" is needed and "successful modelling of a complex data set is part science, part statistical methods and part experience and common sense". For the purpose of this research, "Backward elimination", which can be considered as a type of stepwise regression, is used.

Backward elimination is preferred to forward selection because it reduces the risk of eliminating variables which are only significant in the presence of other variables in the model (a suppressor effect). The risk of excluding such variables is high when using forward inclusion, in which the process starts with one single variable. Usually both methods provide the same results, but when the results differ, backward elimination may uncover relationships missed by forward inclusion. Backward elimination is described as "the most robust choice" since all model terms will be given a chance of inclusion in the model (Design Expert, 2001, p.10-3).

Although the use of this type of regression is criticised for the purpose of testing theory, it is agreed that it is suitable for exploratory work where previous research is limited (which is the case in this research) (Menard, 2001 and Agresti, 2001). Furthermore, the criticism that backward elimination is not the best choice for testing theory is based on a concern about factors which are important in theory could be

eliminated just because they do not meet the criterion of inclusion in the model. In fact, this also should not be of concern to our study for the following reasons:

- Some independent variables which were thought to be important were refitted back in the model, but proved be redundant.
- Constructing a model (independently[283]) in accordance with the so-called "purposeful selection" approach (generally guided by the instructions suggested by Hosmer and Lemeshow (ibid.)[284]) can lead to the same model as one of few alternative models suggested by this approach (more is explained at the end of this section).

The approach of backward elimination is based on the idea of starting the model with all the independent variables (see above the full model). Variables will only be removed if they do not substantially affect the goodness of fit of the model. Removal of variables is based on one of three criteria: likelihood ratio statistic, conditional statistic and Wald statistic (Field 2001). For the purposes of this research, the likelihood ratio statistic, which is believed to be the best criterion (ibid.), is adopted[285]. This means that variables which do not have significant influence on the likelihood ratio statistic are eliminated. Whereas Appendix 10.6 depicts the different steps of elimination, the final results of this modelling process are presented in Table 7.27:

Table 7.27: Results of the Main (constructed) model

Variable[286]	**B**	**S.E.**	**Wald**	**Sig.**[287]	**Exp(B)**	**C. I for exp (β)**	
SEGMENT (+)	1.115	0.339	12.857	**0.000**	3.369	1.734	6.544
AUDITOR (+)	0.723	0.311	5.396	**0.010**	2.062	1.120	3.796
FORMANG (+)	0.606	0.314	3.713	**0.027**	1.833	0.990	3.395
BIMAN1 (-)	0.847	0.363	5.448	**0.010**	2.333	1.145	4.754
OR3ASSET (+)			22.509	**0.000**			
ORASSET(High)	2.184	0.465	22.065	0.000	8.880	3.570	22.086
ORASSET(Mid)	0.544	0.368	2.181	0.070	1.723	0.837	3.545
Constant	-3.132	0.445	49.481	0.000	0.044		
Model Chi-square: 74.076 (Sig: .000)				-2 Log Likelihood = 288.840			

Note: **bold** typeface indicates a statistically significant coefficient at the 0.05[288]. The dependent variable is given 0 for GGAAP and 1 for IRAS. Variables as defined below Table 7.4

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[283] Without being influenced with results of backward elimination.
[284] The modelling here is not fully based on the guidelines by Hosmer and Lemeshow. It is widely recognised among statisticians that personal judgment is essential in this type of modelling.
[285] This is Backward LR in SPSS.
[286] The expected signs for the variables are in the parentheses.
[287] One tailed significance because the hypotheses tested are directional.
[288] Note that ORASSET (categorised total assets) has overall significance, whereas its categories may have different significance levels from each other (see discussion section 7.10)

Using the results shown in the Table 7.27 above. the models can be set in another form which is the predicted probability of the event (complying with IRAS)[289]:

$$P(IRAS) = \frac{1}{1+e^{-Z}}$$

where $Z\ (Logit\ 1) = -3.132 + 1.115\ SEGMENT + 0.723\ AUDID + 0.606 FORMAN + 0.847\ BIMAN1 + 2.184\ ORASSET1 + 0.544$ ORASSET2

From the results above, one can see that the variables FORINVES. LEVER. PROFIT were excluded as they were redundant in multiple settings. On the other hand. BIMAN1[290]. which was not significant at all in the univariable analysis. became significant in the multivariable model. Further analysis showed that ORASSET is the suppressor variable which caused BIMAN1 to become significant. This may be explained by the inverse significant relationship between size and management ownership represented by BIMAN1[291]. A substantial majority (85 %) of the firms with management ownership are classified as "Small".

Furthermore. some of the variables were redundant in the presence of other particular variables. The listing status variable. L.S. was significant when ORASSETS was not in the model. However. it is far from being significant when any of the size variables is in the model. This simply related to the fact that multiple listed companies are almost all large (see above). Dumontier and Raffournier (ibid), for example, use the total assets "LASSET" in a different model from that including the listing status variable "LIST". Agresti' statement (2002, p.217) provides an important conclusion for this discussion "In selecting a model. we are mistaken if we think that we have found the true one".

As stated above, similar results were obtained by the researcher when the "purposeful selection" approach was followed. As a first step to build a model under this approach, Agresti (ibid) recommends researchers study the effect of each single predictor on the dependent variable. This can include graphical smoothing for a continuous variable and a contingency table for a discrete variable. Hosmer and Lemeshow (1989. 2000). on the other hand. suggest contingency tables and chi-square for discrete variables, but also suggest "univariable" regression for continuous variables. Only variables which show a particular level of significance will be qualified for entry in the first multivariable model. They also suggest that the

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[289] The formula shown above is the original form which shows the logit as a function of the IVs
[290] Using MAN1 in both continuous and dummy form gives similar results.
[291] Crosstabulation is not presented

t-test can work as a good univariable technique for this purpose. According to them the variables whose *P* values are less than .25 in the univariable models can be qualified for entry in the first stage of modelling (see results shown in Table 7.25). Yet, they do not set a similar criterion for X^{2} [292].

An enormous number of models can be constructed using the different combinations of variables. Agresti (2002, p.217) states that "Although selection procedures are helpful exploratory tools, the model-building process should utilize theory and common sense". The researcher looked at more than 35 multivariable models with different combinations (a sample is shown in Appendix 10.5)[293]. Judgments made in the process of deleting and refitting variables were based on the following: significance of the model (model chi-square[294]), significance of the variables included in the model and R_L^2 [295]. Because of the relationship between the criteria used in the backward elimination above (likelihood ratio) and the ones used in this process, the researcher found that this judgmental process can lead to results that are compatible[296] to those reported in Table 7.27.

7.8.7 Model Evaluation:

Many studies which used logistic regression fail to report information about assessing the model fit and similar information (Peng and So, 2002). In order to avoid such failure, the following sections are devoted to providing a reasonable level of supplementary analyses through which the Main model can be evaluated[297]. This evaluation is made through the three following stages suggested by Menard (2001):

- Evaluating the overall model
- Evaluating the individual predictors
- Testing the assumptions of the model
- Residual diagnostics

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[292] Still they warn that attention should be given to any contingency table which contains zero cells. They add that including variables which have zero frequencies will cause "undesirable numerical outcomes to occur" (ibid, p 93).

[293] It does not seem to be practical to show results of all these models here, but a part of these results is presented below.

[294] This is explained below in the Model Evaluation section.

[295] This variation measure is not a priority in choosing whether to include a variable in the model or not simply because the main purpose of the model is more than maximizing the variation explained in the outcome (more explanation on this in Section 7.8.8.14).

[296] Because of there is more than one model that can be suggested as a result of this approach. The one reported in Table 7.27 is one of these possible alternatives.

[297] To some extent, this is judgmental as there is no general agreement on what to report.

7.8.8 Evaluating the overall model:

This section aims to answer the question set by Menard (2001, p.18) "can we be confident that there is a relationship between all of the independent variable, taken together, and the dependent variable, above and beyond what we might expect as a coincidence, attributable to random variable in the sample we analyze?" (p18).

7.8.8.1 Goodness of Fit measures:

In general terms, goodness of fit statistics aims to test the fit of the model against the data. This section illustrates the results of the most commonly used measures in this area.

7.8.8.1.1 Model Chi-square (G_M):

The "Model chi-square" is the equivalent to the overall "F" test for the linear regression (Norusis, 2001, Field 2001). It is measured as the difference between the "-2LL"[298] of the model containing only the constant and the complete one. In other words, it is the drop in the "-2LL" as a result of including the predictors in the model. Like many statistics in this field, it has a chi-square distribution. Norusis (2001) suggests that it tests the null hypothesis that all the predictors in the current model (except the constant) have coefficients of 0. Field (2001, p.178) defines it as "a test of the statistical significance of the combined effects of the independent variables within the model". Finally, Menard (2001) advises that for most purposes, researchers should focus on G_M. As shown at the bottom of Table7.27, the model chi-square of 74.076 is highly significant. This indicates that the Main model is significantly better than including only a constant term. This also implies that the set of variables significantly improves the prediction of the log odds. Finally, we can reject the null hypotheses that the coefficients for all of the terms in the model are zero. The full model chi-square was 77.281 (implies slightly higher significance)

7.8.8.1.2 Hosmer and Lemeshow goodness-of-fit index:

One of the most commonly used tests for measuring how well a model fits the observed data, is Hosmer and Lemeshow's (H-L) Goodness of Fit test. This test is calculated using a contingency table created by dividing the sample into ten equal

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[298] $= -2 \times \text{Log } \textit{Likelihood}$ ratio, a commonly used statistic to measure how well the estimated model fits the data

sized groups (approximately) based on the estimated probabilities[299]. This table compares the expected values with observed ones. The statistic derived from this table has a chi-square distribution. In this test we expect the expected and observed values to be close and consequently we expect an insignificant chi-square statistic (H-L. ibid). The following is the contingency table for H-L goodness of fit test and the result of that test.

Table 7.28: Contingency table for Hosmer and Lemeshow test[300]

	G GAAP		IRAS		Total
	Observed	Expected	Observed	Expected	
1	29	28.340	1	1.660	30
2	30	28.334	1	2.666	31
3	22	23.497	5	3.503	27
4	19	22.862	8	4.138	27
5	26	25.804	7	7.196	33
6	26	23.417	6	8.583	32
7	22	20.613	10	11.387	32
8	16	17.096	14	12.904	30
9	12	11.786	21	21.214	33
10	3	3.252	17	16.748	20
Result of H-L test:		Chi-square = 7.932			Sig. = 0.440

The **insignificant** chi-square at the end of Table 7.28 indicates that the model is a good fit. This means that the observed events are not significantly different from the expected ones, which is desirable in this case. This result is consistent with the model's chi-square. The statistic produced by this test for the full model stated above is 4.515 with significance level of 0.808 (this indicates that the full model has better fit)

7.8.8.1.3 Other measures:

Two other measures which may help with the same purpose are Pearson and Deviance Goodness of Fit statistics[301]. These two statistics had significance levels of 0.277 and 0.317 respectively. These large P values give more assurance of the good fit of the model.

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[299] This number by default in SPSS, it can be different and change to more or less in other packages such as SAS.

[300] From this table one needs to check the groups with expected number cells with expected frequencies of less than 5. H-L (ibid) accepted 5 cells with frequencies of less than 5.

[301] SPSS can be unreliable in producing these statistics (Peng and So, 2002). Therefore, these two measures were produced using the Minitab package.

7.8.8.1.4 Measuring the multiple association between the predictors and outcome:

In the linear regression, the statistic R^2 is a very important measure of the usefulness of the model. Gujarati (2003) says that it is "a summary measure that tells how well the sample regression line fits the data" (p81). It is also thought to be a measure of the proportion the variation in the outcome accounted for by the explanatory variables. For the logistic regression, there may be some debate about the analogue to R^2 (Field 2001, Menard ibid.). Garson (2004), for example, suggest many measures of which are: Cox and Snell's R-Square, Nagelkerke's R-Square and Pseudo-R-square. Results of show that Cox and Snell R-Square = 0.222, while Nagelkerke's R-Square =0.314. On the other hand, Gujarati (ibid) and Menard (ibid) support the use of McFadden R_L^2 (also R_{McF}^2). R_L^2 can be calculated using different formulas of which:

$$\textit{Model}\ \text{chi - square / Original - 2LL} = 74.076/(74.076 + 288.840)^{302} = 0.204$$

According to this result, it seems that about 20.4% of the variation of the outcome is explained by the independent variables. Although this amount of variation seems to be moderate, we should remember that our aim from this regression is to attain reliable estimates of the coefficients and not maximize this statistic (see Gujarati, 2003). One should also note that the two other measures above give better results. Finally, the comparable measures of the full model were: Cox and Snell R-Square =0.230, Nagelkerke's R-Square = 0.326 and McFadden R_L^2 = 0.213. in general, results seem to be similar to the ones of the reduced model.

7.8.8.1.5 Accuracy of prediction:

One can measure who well a model performs by measuring its accuracy in classifying the sample into the two groups: GGAAP firms and IRAS firms. Table 7.29 shown below is a classification table which is produced by SPSS.

Table 7.29: Classification table

	Predicted		% correct
Observed	G GAAP	IRAS	
G GAAP	191	14	93.2
IRAS	52	38	42.2
Overall percentage			77.6

[302] Notice here that the original -2LL is calculated by adding the model chi-square to the model -2LL because it is the change in -2LL that is resulted form including variables in the model.

Table 7.29 compares the compares the observed and predicted group membership by classifying firms which have a predicted probability of 0.5 or greater as IRAS. According to this table, a high percentage of the G GAAP firms were correctly assigned to their right group. Conversely, it seems to be less predictive in the IRAS group. In total 229 out of 295 companies were correctly classified which gives an overall percentage of 77.6 %[303]. Using the full model increase the number of correctly predicted IRAS to 41, but with the same overall percentage of 77.6% (less correctly predicted GGAAP cases (188 instead of 191 above))

Menard (2001) suggests three alternatives for measuring predictive efficiency which are λ_p, ϕ_p and τ_p. For the purposes of this study, the researcher chose lambda-p (λ_p), which is the most conservative measure[304].

λ_p= (Number of firms in the smaller observed category – number of firms incorrectly predicted by the model)/ number of firms in the smaller observed category

= (90-66) / 90 = 0.27

This level can be described as a moderately strong reduction in error. To measure the significance of this index, the binomial d statistic should be calculated (Menard, ibid).

$d = (P_e - p_e) / \sqrt{P_e(1-P_e)/N}$ Let: P_e = proportion of errors without the model, p_e = proportion of errors with the model, and N = total sample size.

Furthermore, P_e = the number of firms in the smaller category[305] / total sample size

Then $d = (0.305 - 0.224) / \sqrt{0.305(1-0.305)/295} = 3.035$ with statistical significance $p = 0.000$[306]. This indicates that the proportion predicted incorrectly by the variables in the model differs significantly from that predicted without it.

Another measure can be calculated here without much detail is tau-p (τ_p).

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[303] It is shown in the output by SPSS that the highest percentage can be achieved by chance is 69.5 % which is calculated by classifying the firms in the largest observed group (GGAAP) correctly. Considering this, the model performs better than this by a margin of 9.1 %. To know how significant is this performance of the model over chance, we should look at "d" test shown below

[304] This measure was recommended by Professor Scot Menard via email. Furthermore, it may be more appropriate when a model involves only dichotomous predictors (Menard 2001).

[305] This is only in the case of this measure where the "expected number of errors" equals the number of firms in the smaller category. This is calculated differently in the case of τ_p

[306] d is assumed to be normally distributed. Therefore its significance is checked in the tables of the normal curve.

$\tau_p = 0.472$ $d = 6.961$[307] with statistical significance $p = .000$

The index τ_p shows better performance in classification than that measured by λ_p.

Finally, one should remember that the main aim of this study is to test theory. This simply makes the goodness of fit more important than measuring the accuracy of prediction (Menard, 2001)[308]. It should be mentioned here that the full model shown above has exactly the same overall percentage of 77.6%.

7.8.8.2 Evaluating individual predictors:

This section concerns the interpretation of the coefficients and the odds ratios of the variables included in the model. Furthermore, it explains some other variables which were excluded from this model.

7.8.8.2.1 Interpretation of coefficients and the odds ratios:

This section discusses the contribution of the different variables in this model which contribute to the prediction of the outcome. For ease of interpretation, it is commonly known that it is better to interpret the exponentiated coefficients $\exp\beta$ (Exp (commonly known as odds ratio) rather than the coefficients themselves. Interpreting the relationship between the $\exp\beta$ and the odds of an event[309] does not need logarithmic transformation (Field 2001). In other words, it is easier to understand the change in the odds of an event than the change in the log of the odds. Its interpretation is the change in the odds of an event (probability of event /Probability of non-event)[310] as a result of one unit change in the predictor[311]. The following is an interpretation for all the variables included in the model shown above. In general positive coefficients indicate the positive relationship between the variables and the log of the odds. They also indicate that the odds ratios are greater than 1. An odds ratio greater than one means an increase in the odds. Conversely, an odds ratio of less than 1 (negative coefficient) indicates a decrease in odds.

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[307] d result from the same formula shown above but with P_c calculated differently (see Menard 2001)

[308] Although Menard (2001) provides some measures for this purpose, he tells that the literature in the area is very limited and not well developed.

[309] The odds of an event $= P(event)/P(no\ event)$

[310] One should always bear in mind that there is difference between the odds ratio and the odds. The relationship between them is that the odds ratio determines the change in the odds.

[311] Positive coefficients lead to odds ratios of larger than "1". This will also mean that an increase in the predictor causes increase in the odds of the outcome

SEGMENT: If a German listed firm is classified in a market segment (DAX, MDAX or SMAX), the odds of its compliance with IRAS increase by a factor of 3.369[312]. In other words German listed "classified" firms are more likely to comply with IRAS than the unclassified ones. The 95 % confidence interval ranged from 1.734 to 6.544, means that we can be fairly confident that the odds ratio cannot take the value "1"[313]. This means that such result can be generalized to the population[314] (Field 2001, Norusis, 2001). **AUDID:** the fact that a German listed firm has a Big-5 auditor increase the odds of adopting IRAS by a factor of 2.06. That is to say that their tendency to adopt IRAS is more than that for those employing a Non-Big5 auditor. **FORMAN:** the positive coefficient and the odds ratio with a value larger than 1 indicates that the presence of a foreign manager on either the supervisory board or the executive board increases the odds of complying with IRAS (by 1.833). The same interpretation applies to the odds ratio of **BIMAN1** which indicates that the odds of using IRAS by a German listed firm increase by 2.333 when managers hold a proportion of its shares. Finally, being in the highest category of assets **(ORASSET (High))** increases the odds of using IRAS by 8.880 times[315] than for the ones in category (Low). The odds ratio of ORASSET (Mid) indicates that being a Firm in the Medium category increases the odds of being an IRAS firm comparing with those in the category (Low), but with much smaller factor than that for the ones in the higher category.

One important thing to be emphasized in these results is that the confidence intervals for the $\exp(\beta)$ for all the variables except for FORMAN do not contain the value "1". As mentioned above, having such confidence interval indicates that the direction of the relationship is stable in the population as a whole (see Footnote 311). In other words, this makes us confident about the effect of the variable. Furthermore, also for the variables FORMAN and FORSUB, the confidence interval barely crosses the

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[312] The odds ratio is the exponentiated coefficient 1.112 ($e^{1.112}$). The logit is based on the value of "1" for the odds of event (adopting IRAS). Recalling the fact that odds ratio greater than "1" increase the odds of the event, the switch in SEGMENT from "0" to "1" means the odds will equal 1×2.668

[313] An odds ratio of 1 is the equivalent to a coefficient of zero (simply because $e^0 = 1$). Odds ratio of "1" means that does not have impact on the odds of the event.

[314] We can be confident that the exp β in the population lies somewhere in the range of this interval. Still, one should remember her that the population here is data of companies at any points of time other than the sample year.

[315] Note that one can interpret the odds ratio in slightly different ways.

value 1. This implies that we can be fairly confident about the results for these two variables (see Hosmer and Lemeshow. 1989)[316].

7.8.8.2.2 Interactions:

An interaction can only be included in the model if the main effects which make up this interaction were in this model (Agresti, ibid, Hosmer and Lemeshow, ibid). Based on this rule, a group of interactions that may be theoretically plausible were set. Few of these terms were significant in univariable[317] models. These interactions were introduced to the model above. However, improvements in the model were very small. These little improvements were measured in terms of the reduction in -2LL. Therefore, the researcher decided to exclude them to avoid any drawbacks of including variables which do not improve the model (overfitting)[318]. This may be consistent with a statement by Agresti (2002, p.174) "if more complex models do not fit better, this provides some assurance that the model adopted is reasonable".

7.8.8.3 Testing assumptions of the model and model diagnostics:

There is no clear consensus on a group of assumptions for the logistic regression. This section concerns testing the assumptions widely accepted in the literature[319].

7.8.8.3.1 Linearity:

Unlike in linear regression, linearity between the independent variables is not assumed. However, in a logistic model it is strictly assumed that the continuous independent variables are linear in the logit (Hosmer and Lemeshow 1989, 2000, Frank and Harrell, 2001). There was no need to test this assumption here, as in the Main model adopted there is not any continuous predictor[320]. Furthermore, alternative models which contained continuous variables showed that the logit was not linear in the size variables.

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[316] They interpreted similar intervals in a similar way and considered them to be good results.
[317] The models including only the interaction term
[318] This exclusion was after consultation made by emailing Professor Fred Pampel, Professor Richard Scheaffer and Professor Scott Menard
[319] In addition to specific related references, Professor Marjia Norusis and Professor Scott Menard were also consulted by the researcher about the assumptions that to be checked for the case of this study.
[320] This assumption is checked for the only continuous variable in this study lnEMPNO in one of the alternative models.

7.8.8.3.2 Additivity:

Non-additivity may occur when the change in the dependent variable resulting from a one unit change in the independent variable depends on the value of one of the other variables. Menard (2001. p75) states that detecting non-additivity is not "straightforward" and that researchers are commonly left with a choice between assuming an additive model and testing for all plausible interactions (see above for testing interactions).

7.8.8.3.3 Testing for multicollinearity:

The absence of multicollinearity is widely recognized as an assumption for a logistic model. It occurs when one or more of the predictors in the model can be approximately determined by some of the other predictors. According to Kleinbaum (2001, p.168), multicollinearity can lead to "highly unreliable" estimated coefficients and "consequently, any modeling strategy must check for possible multicollinearity at various steps in the variable selection process". In a multiple logistic regression one should consider only these variables which would not create high levels of multicollinearity (Menard 2001). Table 7.30 shows two of most commonly used statistics in testing multicollinearity[321]:

Table 7.30: Multicollinearity diagnostics 1

	ToleranceV	**VIF**
SEGMENT	.863	1.158
AUDID	.937	1.067
FORMAN	.923	1.083
MAN1	.786	1.273
ORASSES1	.697	1.435
ORASSET2	.821	1.218

Variables as defined below Table 7.4

Menard (2001) consider a tolerance value of less than 0.1 to be an indication of serious problem with multicollinearity, whereas Garson (2004) set a tolerance value of .250 and VIF of 4 as indication of "too much" multicollinearity rule. According to Myers (1990), a VIF value of larger than 10 can be a problem. From Table 7.30, it can be seen that the smallest tolerance value was 0.697, while the largest VIF was 1.435. Such values show that there is no sign of multicollinearity.

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[321] SPSS does not produce these statistics for logistic regression. Therefore, as recommended by Field (2001) and Norusis (2001), linear regression was run using the binary outcome to produce these statistics.

An additional tool to diagnose multicollinearity is to examine the so called Eigenvalue and Condition Index. Table 7.31 shows both the Eigenvalues and the condition index values which can be an additional tool to diagnose multicollinearity:

Table 7.31: Multicollinearity diagnostics 2

Dimension[322]	Eigenvalue	Condition index
1	3.651	1.000
2	1.082	1.837
3	.891	2.025
4	.581	2.508
5	.404	3.004
6	.258	3.764
7	.134	5.219

According to Field (2001), there are no rigid criteria to determine how much smaller (larger) an Eigenvalue (Index Condition) [323] needs to be to indicate a multicollinearity problem. However, a common rule of thumb suggests that "a condition index greater than 15 indicates a possible problem and an index greater than 30 suggests a serious problem with collinearity" (Result Coach/ SPSS11). From Table 7.31, it can be seen that the largest Condition Index is far less than the criterion quoted above. Finally, the coefficients in the correlation matrix in Table 7.4 support the results discussed above.

7.8.8.3.4 Zero Cells:

Il-L (2000) and Menard (2001) emphasize that attention should be given to zero cells. There should be no zero cells when contingency tables are produced by categorical variables. The contingency tables presented earlier in this chapter show that there are no such cells.

7.8.8.3.5 Autocorrelation:

Arises only when the data are sequenced in some way as in time series data, which is not the case here (Garson, 2004)[324].

7.8.8.4 Analysis of Residuals:

The residual is the difference between the observed probability and the predicted one using the model estimates (Norusis, 2001). There are two main purposes of residual analysis: one is to detect cases for which model fits poorly and second is to detect

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[322] There is 1 dimension for each parameter.
[323] The Condition Index tells about the Eigenvalue in a different way (a small Eigen values means large Condition Index)
[324] This was also confirmed by Professor Scott Menard via email

cases that exert an undue influence on the estimated parameters of the model (Field, 2001).

For the purpose of identifying the cases for which the model works poorly, it is suggested by Menard (2001) that researchers should use the Studentized residuals[325]. These residuals can be examined against the criterion that cases with values outside of ± 2.5 should be looked at closely, whereas cases with values outside of ± 3 should be cause for concern.

Pearson residuals (also known as Standardized[326]) can be used as well. The Pearson residual has larger values than those of the Studentized residuals. Menard (2001) and Field (2001) suggest that, with the Standardized (Pearson) residuals, one would expect 5 % of the sample to have values outside the range ± 2 and 1 % outside ± 1. Table 7.32 shows that the percentage of Studentized residual and Deviance statistic outside ± 2 is much less than 5 %, whereas the percentage of Standardized residual values outside ± 2.5 is 3 %.

According to the criteria above, the only cases which need to be looked at closely involve 8 companies. If the judgment is based on having standardized residuals outside ± 3, only two companies cause concern. One of these companies is Softship AG, which is using IAS despite the fact that it is not in a quality segment, with a small auditor, has no foreign manager and is categorized as Small. Still, this company has a factor which is included in the Main model as a significant predictor. Managers in this company own a share in its equity capital (see discussion on results in Table 7.36 below). Furthermore, this company has a foreign subsidiary and sales abroad. This element of internationality may be a good explanation for the adoption of IAS (see discussion below)

The second company Sartorius AG is not classified in a quality segment, with a non-Big-5 auditor, is categorized as small, but has a subsidiary abroad and at least one foreign manager on its management board. These last two factors may be enough reasons for a firm to comply with IAS because they are significant factors (see discussion on internationality below). Furthermore, looking at the data of this firm in particular showed that it has a subsidiary in the US. Having a subsidiary in the US is

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[325] presented in SPSS under the name "Sre"
[326] presented in SPSS under the name "Zre"

also a highly significant factor: nonetheless it is not included in the model above[327]. In fact, there is no need to exclude these two companies after ensuring that the data is correct. Furthermore, the other types of residuals (Studentized and Deviance) for these companies are still within the range ± 2.5.

As shown in Table 7.33, each of the other firms with standardized residuals within the range ± 2.5 has a few characteristics that are consistent with the implications of the model above. Hence there is no need for further investigation

Overall, we should notice that it is only Pearson residuals which have values outside the range ± 2.5. This was because values of this type of residuals tend to be larger than those of the other types. This note can give us more assurance about the model[328].

Table 7.32: Residual diagnostics in the Main Model

Residual	**± 2**		**± 2.5**		**± 3**	
Studentized (sre)	7	2.4 %	0		0	
Deviance (dev)	7	2.4 %	0		0	
Standardized (zre)	18	6.1 %	7	2.4 %	2	0.7 %

Table 7.33: Cases for which the Main Model fits poorly

	ACC	Segment	AUDID	FORMAN	BIMAN	Size
Firms with standardized residuals outside the ± 3 range:						
Softship AG	IAS	0	0	0	1	Small
Sartorius AG	IAS	0	0	1	0	Small[329]
Firms with standardized residuals outside the ± 2.5:						
Zapf Creation AG	USGAAP	1	0	0	0	Small
Burgbad AG	IAS	1	0	0	0	Small
MPC Capital AG	IAS	1	0	0	0	Small
Sanacorp Pharmahandel	IAS	1	0	0	0	Med[330]
Softship AG	IAS	0	0	0	1	Small
Uniprof Real Estate	IAS	0	1	0	1	Small

7.8.8.4.1 Influential cases:

The residuals investigated above help to determine the cases for which the model fits poorly. To find if there is any cases which have a high influence on the model a few influence statistics can be produced. The most commonly used statistics for this

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[327] Although having a subsidiary in the US is a hypothesis for compliance with US GAAP, it is not theoretically justified to explain the use of IRAS in general.
[328] Having other types of residuals within the acceptable limits is a good indicator (Menard 2001)
[329] Small in terms of turnover and asset but Medium in terms of employees' numbers
[330] Small in terms of employees' numbers but medium in terms of turnover and total assets

purpose are the leverage and the DFBeta values[331] (Menard 2001. Field 2001). The leverages are assumed to be small and not much larger than the expected value. Leverage values of the model above were all very small and very close to the expected value of .027[332] (maximum value of 0.08).

A DFBeta greater than "1" indicates possible influential cases. All the DFBeta values produced by the model above were far less than 1 (maximum value of 0.13)[333]. The finding that there were not any influential points may be explained by the fact that all the predictors are dummy variables where outliers do not exist[334].

7.8.9 Significant factors excluded from the model:

As mentioned above, some of the variables were excluded from the model presented above as they were redundant and insignificant. However, these variables were significant in other multivariable models[335]. These variables are FORINVES, LIST, USSUB, PANDC and all size variables (see Appendix 5).

Although FORINVES (having foreign investors) was insignificant in the univariable and bivariate analysis[336], it becomes significant when we control for SEGMENT. This suppression effect is the result of the significantly negative relationship between these two variables (explained in the discussion section 7.10).

The impact of the listing status variable (LIST), on the other hand, is masked by the size variables. This is almost certainly a result of the significantly positive relationship between size and listing status (explained above in the crosstabulations and chi-square test).

All the size variables are, in fact, significant in alternative models. Yet, none of these variables is linear in the logit (see discussion section 7.10).

7.9 Results of the multinomial logistic regression:

This type of model is explained explicitly in Chapter 6. Whereas. ANOVA and Kruskal-Wallis are used above to test differences between the three groups of companies (IAS, US GAAP and G GAAP) using one statistical test, the multinomial

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[331] DFBeta, measures the change in the regression coefficients as a result of removing one of the cases. whereas the Leverages measure the relative influence of each observation of the model's fit.

[332] The values of leverage lie between 0 and 1. The expected value can be calculated by the formula (k+1) N; where K is the number of the parameters and N is the sample size = 8 295=0.027

[333] 95 % of these values are less than 0.052

[334] It is common knowledge that outliers can have large influences on the estimates of parameters.

[335] These models are not presented here.

[336] Recall that bivariable analysis means the use of chi-square

model is intended to show the relationship between a group of variables and the choice of one of the three accounting sets. It may be useful to remind readers here that although the choice between IAS and US GAAP is studied in the following chapter, this analysis is also useful because it considers the G GAAP choice compared with each of IAS and USGAAP separately.

The process of choosing was similar to that in the binary logistic regression. However, the results were limited by the number of variables that can be included in the model. The number of US GAAP firms is only 23, which means that the number of events in the smallest group is only 23. This, in turn, limits the number of variables in the model to three variables.

As explained in Chapter 6, the limited number of USGAAP companies makes this analysis less important and, consequently, informal. Therefore, only the results of the adopted model and the related interpretations are presented with here. The aim is simply to show the most important factors associated with the choice between the three GAAPs. Table 7.34 contains the results of the multinomial model adopted.

Table 7.34: Results of the Multinomial Model for choice between GGAAP, IAS and US GAAP

		B	Std. Error	Wald	Sig[337].	Exp(B)	95% Confidence Interval for Exp(B)	
IAS	Intercept	2.053	0.624	10.818	0.001			
	FREFLOAT	-1.251	0.930	1.810	0.178	0.286	0.046	1.771
	USLIST	-2.021	0.903	5.007	0.025	0.133	0.023	0.778
	[USSUB=1]	-0.280	0.590	0.226	0.635	0.755	0.238	2.402
GGAAP	Intercept	4.059	0.589	47.418	0.000			
	FREFLOAT	-1.908	0.888	4.613	0.032	0.148	0.026	0.635
	USLIST	-1.998	0.816	5.998	0.014	0.136	0.027	0.671
	[USSUB=1]	-1.642	0.552	8.841	0.003	0.194	0.066	0.571

Variables as defined below Table 7.4

The reference category in the model is the US GAAP group. This allows us to compare each of IAS and G GAAP companies with the US GAAP companies (see Chapter 6). The model shows that most important predictors in the choice of G GAAP and US GAAP are free float (FREFLOAT), having a subsidiary in the US (USSUB) and listing on NYSE (USLIST).

The results of the variable FREFLOAT in "the G GAAP" section of Table 7.34 indicates that a free float increase of one unit (0.01) decreases the log of the probability ratio between G GAAP and US GAAP by -1.908 (B). In terms of

[337] One-tailed significance is considered here because the hypotheses related to the variables in the model are unidirectional.

probabilities, this means that an increase of one unit in the free float decreases the ratio of the probability of being a GGAAP company to the probability of being a US GAAP company by 0.026. Overall, it can be said that the increase in free float increases the probability of using US GAAP to using GGAAP. In the IAS section, on the other hand, this variable is not significant. Analyzing the relationship between IAS and US GAAP is considered in Chapter 8.

The results for the variable USLIST suggest that listing on NYSE decreases the probability of being a GGAAP company to that of being a USGAAP company by 0.136. USLIST is also significant factor in determining the choice of IAS compared with USGAAB. On the other hand, whereas having a subsidiary in the US decreases the probability of being a GGAAP company to that of being a USGAAP one, it is not an important factor in determining the choice of IAS compared with USGAAP.

The model above is based on allocating the US GAAP group as a reference category. This does not allow us to compare the probabilities of using G GAAP to those of using IAS. Therefore in another step the IAS group was made the reference category. Table 7.35 shows that the only significant factor in the model that affects the choice between G GAAP and IAS is "USSUB". The results indicate that having a subsidiary in the US decreases the ratio of the probability of using GGAAP to the probability of using IAS by a factor of 0.256.

It should be indicated that size in terms of turnover and employees` numbers is also an important predictor in determining the choice between GGAAP and USGAAP; nevertheless it is not included in the model. Results of size are similar to those of free float. This can be related to the significant positive correlation between size variables and free float. Adding one of the two size variables to the model masks the significance of USLIST as a factor of the choice between GGAAP and USGAAP (but not between IAS and USGAAP, where it stays significant). One explanation is that nearly all the companies listed on the US are larger companies. Moreover, size is highly insignificant in the choice between IAS and USGAAP (tested in Chapter 9).

Table 7.35: Multinomial model results with IAS as a reference category

		B	Std. Error	Wald	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
USGAAP	Intercept	-2.053	0.624	10.818	0.001			
	FREFLOAT	1.251	0.930	1.810	0.178	3.495	0.565	21.635
	USLIST	2.021	0.903	5.007	0.025	7.542	1.285	44.275
	[USSUB=1]	0.280	0.590	0.226	0.635	1.324	0.416	4.210
GGAAP	Intercept	2.006	0.297	45.670	0.000			
	FREFLOAT	-0.657	0.571	1.320	0.251	0.519	0.169	1.589
	USLIST	0.022	0.959	0.001	0.981	1.023	0.156	6.704
	[USSUB=1]	-1.362	0.300	20.546	0.000	0.256	0.142	0.462

Variables as defined below Table 7.4

Table 7.36: Summary of results of all statistical analysis on the choice between GGAAP and IRAS

Hypotheses (null form)	Chi-square[338]	t-test	Mann-Whitney	Univariable models	Multivariable models	Comments
$H1_0$: Compliance with IRAS is either not associated with size or negatively related with it.	H_0 : rejected H_1 : accepted	H_0 : rejected H_1 : accepted	H_0 : rejected H_1 : accepted	H_0 : rejected H_1 : accepted	H_0 : rejected H_1 : accepted	Non-linear relationship
$H2_0$: Compliance with IRAS is either not associated with being in a quality segment or negatively related with it.	H_0 : rejected H_1 : accepted	N/A[339]	N/A	H_0 : rejected H_1 : accepted	H_0 : rejected H_1 : accepted	
Hypotheses on ownership structure:						
$H3a_0$: Compliance with IRAS is either not associated with free float or negatively related with it.	H_0 : rejected H_1 : accepted	H_0 : rejected H_1 : accepted	H_0 : rejected H_1 : accepted	H_0 : rejected H_1 : accepted	H_0 : accepted	Not included in the Main Model because it is redundant in the presence of SEGMENT
$H3b_0$: Compliance with IRAS is either not associated with management ownership or positively related.	H_0 : accepted	H_0 : accepted	H_0 : accepted	H_0 : accepted	H_0 : "partly" accepted	BIMAN1 is included in the Main Model but not with the expected sign
$H3b_0$: Compliance with IRAS is not associated with the presence of a bank representative.						Not tested because of incomplete data.
Leverage, Profitability and Auditor ID:						
$H4_0$: Compliance with IRAS is either not associated with leverage or positively related with it.	H_0 : rejected H_1 : accepted	H_0 : accepted	Not tested[340]	H_0 : accepted	H_0 : accepted	Although results are not significant, they showed negative relationship as expected.

[338] One should remember that chi-square is used with all variables even the continuous ones (after being categorized of course).
[339] Not applicable because it is a binary variable.
[340] It is normally distributed, so that there was no need to use a non-parametric test.

Hypotheses (null form)	Chi-square[338]	t-test	Mann-Whitney	Univariable models	Multivariable models	Comments
$H5_0$: Compliance with IRAS is either not associated with profitability or negatively related with it.	H_0 : accepted	H_0 : accepted	H_0 : rejected	H_0 : accepted	H_0 : accepted	The result of Mann-Whitney is significant for PROFIT2 but not PROFIT1 (see also ANOVA results)
$H6_0$: Compliance with IRAS is either not associated with having a Big-5 auditor or negatively related with it.	H_0 : rejected H_1 : accepted	N/A	N/A	H_0 : rejected H_1 : accepted	H_0 : rejected H_1 : accepted	
Hypotheses on Internationality:						
$H7_0$: Compliance with IRAS is either not associated with being listed abroad or negatively related with it.	H_0 : rejected H_1 : accepted	N/A	N/A	H_0 : rejected H_1 : accepted	H_0 : accepted	Insignificant in the Main Model with size variables in the same model, but significant in other multiple models
$H8a_0$: Compliance with IRAS is either not associated with having foreign investors or positively related with it.	H_0 : accepted	N/A	N/A	H_0 : accepted	H_0 : accepted	In alternative models which control for SEGMENT as a suppressor
$H8b_0$: Compliance with IRAS is either not associated with having foreign managers on executive board or supervisory board or negatively related with it.	H_0 : rejected H_1 : accepted	N/A	N/A	H_0 : rejected H_1 : accepted	H_0 : rejected H_1 : accepted	
$H9_0$: Ceteris paribus: the tendency of German firms to voluntarily adopt IRAS is either not associated with having a foreign subsidiary or negatively related with that.	H_0 : rejected H_1 : accepted	N/A	N/A	H_0 : rejected H_1 : accepted	H_0 : rejected H_1 : accepted	

Hypotheses (null form)	Chi-square[338]	t-test	Mann-Whitney	Univariable models	Multivariable models	Comments
Industry:						
$H10_0$: Compliance with IRAS is not associated with industry sectors.	H_0: rejected H_1: accepted	N/A	N/A	H_0: rejected H_1: accepted	H_0: accepted	Significant when included with FORSUB, AUDITOR in one model

7.10 Summary and discussion of the results:

Table 7.36 present a summary with the results of this chapter and the related hypotheses. However, this table excludes the results of ANOVA, Kruskal-Wallis and the multinomial model. Results of the analysis on the three groups: IAS, US GAAP and GGAAP are discussed in Chapter 8.

The hypotheses tested in this chapter are on the choice between GGAAP and IRAS; nevertheless a part of the analysis is concerned with the choice between GGAAP, IAS and US GAAP. The statistical analysis presented above aims to test each of the study's hypotheses extensively through three levels of analysis: univariable, bivariable and multivariable. One important observation of this analysis is that there is no persistent consistency between the results of the three types.

The null hypothesis on **size** is rejected at all levels, indicating that larger German firms are more likely to be IRAS companies. However, the relationship between size and compliance with IRAS does not appear to be linear. The non-linearity between size and the logit (log of the odds of adopting IRAS) is evident by testing for linearity using Box-Tidwell. Referring to Table 7.5, percentages of companies using IRAS in Large, Medium and Small Category are approximately: 77.1%, 33% and 20%, respectively[341]. One can see that the percentage of medium firms using IRAS is not much higher than that of small firms, or at least it is substantially lower than that of large companies. The question is what makes the two categories Medium and Small have very close percentages, and what makes the difference between the percentages in Large and Medium categories so large. To some extent, this may be blamed on the fact that "Unclassified" firms comprise a large percentage of the category Medium (given the positive impact of being in a quality segment on the adoption of IRAS, explained in a later section). However, the medium category is still insignificant after controlling for SEGMENT, which means that there are other reasons for this non-linearity. Furthermore, the impact of SEGMENT is discussed in a separate section below. Still, this non-linearity does not lead to accepting the null hypothesis that size is not associated with the adoption of IRAS, especially that the overall significance of the size variable as presented in Table 7.27 is high (P value < .000).

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[341] Percentage presented in the Table 7.5 are calculated horizontally, whereas these percentages are calculated vertically and not presented in the table.

Despite the significant tendency in the larger firms to comply with IRAS, some very large firms such as BASF, Linde and Deutsche Telecom are still using GGAAP. Further examination of the data of these companies shows that they do not have distinctive characteristics compared with other larger firms. In other words, they belong to a particular industry sector and are classified in a quality segment. However, all these companies seem to have one thing in common that is the absence of management ownership (in terms of MAN1). When family ownership is considered (MAN2 and MAN3), only two of these companies appear to have management ownership. This may provide some support for the result on the impact of management ownership which is discussed in a later section.

The result that size is a determinant of choosing accounting standards is consistent with the results of Dumontier and Raffournier (1998) and Cuijpers et al (2002). Tarca (2004), on the other hand finds that size is a significant factor in choosing IAS by companies in the "internationally mixed" sample, but not in the subsample comprising German firms[342]. This contradicts the results of ANOVA, Kruskal-Wallis and the multinomial model discussed above[343], which show that size is materially different across GGAAP and IRAS firms. However, some concerns about the sample taken by Tarca may explain the difference. Her German sample comprises only 13 companies, which are not chosen randomly and which were likely to be larger companies[344].

Being in a quality **segment (SEGMENT)** is one of the significant factors included in the adopted model. The null hypothesis is rejected in the univariable, bivariable and multivariable analysis. There are no results from the extant literature to be compared with those presented here, because this hypothesis has not been tested before. This is because of the limited literature on the adoption of IRAS. Furthermore, this kind of segmentation exists in the Frankfurt Stock Exchange, but not in the same form in other exchanges. It should be remembered here that size is not the only criterion to classify a German listed company in a quality segment (different from FTSE 100, for

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[342] She studies a sample of companies from different countries. At the same time she tests a subsample of companies of each country.

[343] Although size is not reported in the multinomial above, it is significant but excluded to show the significance of US listing.

[344] Tarca ordered annual reports form the largest 150 German companies, in addition to the ones which were mentioned in the lists of foreign companies in 5 stock exchanges (for example German on NYSE lists). Overall the annual reports received numbered only 13 and they were all included in the study.

example). In general, German companies classified in quality segments are required by the private law of the Deutsche Börse to provide information of higher quality. Furthermore, classified companies are represented by market indices such as DAX and DAX 100 and are therefore the focus of investors' attention. This makes IAS and US GAAP convenient options for these companies to satisfy the strict requirements of the stock market and to meet the need for investor-oriented information.

Further analysis using a nominal variable that represents the different segments (four categories: DAX, MDAX, SMAX and Unclassified instead of a binary variable: classified or not) gives the same result. It also shows that the higher the segment is, the more the likelihood of using IRAS (see Appendix).

Another kind of segmentation in German exchanges is the statutory segmentation: Official and Regulated markets. The relationship between compliance with IRAS and being in one of these statutory segments was also tested (informally), but it was not significant.

The null hypothesis on **free float** is rejected through the results of all univariable tests, but it was not included in the Main Model. Yet, it is significant in another multivariable model by omitting SEGMENT. There is clear relationship between these two variables. Free float is expected to be higher in companies classified in the quality segments DAX and SMAX (but not MDAX[345]), where they are required to have a minimum free float. This may be confirmed by the significantly positive correlation between the two variables SEGMENT and FREFLOAT (also a highly significant chi-square between categorized free float and quality segments). Because of this significant relationship, FREFLOAT was masked by SEGMENT.

The alternative hypothesis on free float states that German companies' propensity to comply with IRAS is positively associated with free float. According to agency theory, as explained in Chapter 5, compliance with IRAS in firms with wide dispersion of ownership can be a monitoring activity imposed by shareholders, or a bonding activity imposed by managers. It also can be considered as a signal by managers to owners that they are acting in their best interest.

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[345] MDAX companies are not required to have a specific minimum free float percentage.

This result is consistent with Dumontier and Raffournier on compliance with IAS by Swiss companies. It is also consistent with Hossain et al (1994) and Ruland et al (1990), indicating that voluntary disclosure increases with the level of free float.

Conversely, with the **management ownership** variables, the results of multivariable analysis indicate that one of these variables (MAN1) is a significant predictor of choosing IRAS, whereas the univariable and bivariable analysis accept the null hypothesis. Yet, the multivariable model indicates a positive relationship between the presence of management ownership and choosing IRAS, which is the opposite of that expected. The hypothesis, stated in Chapter 5, is based on arguments from previous literature, and is that the likelihood of using accounting standards of high quality (i.e. IRAS) decreases with the proportion of management ownership (remember that the management ownership variable is expressed here as a binary variable), because there is less need for monitoring by outsiders. However, the explanation provided in chapters 2 and 5 on the complex environment of ownership, control and conflict of interests in German firms may justify having the opposite result to that suggested by the literature. The positive relationship, on the other hand, may be explained by the tendency of managers who own equity in the company to develop its accounting reporting system to what they believe is in the best interest of the firm. This can be justified by the benefits that managers would expect from using IAS or US GAAP. This may raise a question on what benefit managers do get from sharing high quality information with investors. However, this is not absolutely true because adoption of IRAS can have more advantages than providing useful information for investors. A survey by PricewaterhouseCoopers (2002b) indicates that a majority of the European CFOs believe that IAS and US GAAP can be useful for internal reporting (see Chapter 4). Another survey by Mazars (2003) shows that nearly 87 % of German listed firms surveyed believes that the conversion to IAS will help them to improve the internal organisation of their company. Furthermore, Leuz and Verrecchia (2000) proved that the adoption of IRAS by German firms is associated with lower bid-ask spreads and higher share turnover. Moreover, PricewaterhouseCoopers (2004) state that financial advisers working in many capital markets insist that companies should use IAS if they are planning a public offering. They also state that "using IAS as a common financial language for the whole group can improve management reporting and decision making". Managers who own a

proportion of their company's equity are expected to consider these advantages of IRAS and adopt it, if they believe it can benefit them.

As explained above, the suppressor variable that makes MAN1 significant in the multivariable model is ORASSETS. Given, the significantly negative relationship between size and MAN1, one may state that the tendency to comply with IRAS increases in small German firms with management ownership. This result may imply owner-managers of relatively small companies may be trying to publicise the attractiveness and enhance the image of their firms by using IRAS, in order to raise capital (equity, debt or maybe both), which is consistent with the explanation given above.

Although the null hypothesis on **leverage** is accepted through most of the statistical tests, it was rejected when tested by chi-square. Still, one needs to remember that using chi-square with continuous variables (after they have been converted into categorical variables) is only designed to support the appropriate statistical analysis for this type of variable (see above and Chapter 6). Hence, one can conclude that leverage is not an important factor in the choice between IRAS and GGAAP. Dumontier and Raffournier (ibid) and Cuijpers (ibid) also failed to establish a relationship between leverage and the choice of international accounting standards. Although Tarca (ibid) did not find leverage to be significant in her analysis of the full sample, she finds that it is significant in the analysis of the subsample of German firms. However, it was explained above that the very small sample of German companies used by Tarca seems to made her findings unreliable.

In the case of **profitability**, the null hypothesis is accepted in all statistical tests, except Mann-Whitney. The results of Mann-Whitney (marginally significant in a 2-tailed test) presented in Table 7.22 above indicate a significant difference in the median of the two groups, IRAS and GGAAP (there is no sign for the difference in the Mann-Whitney results). The **insignificant** results of the t-test show that the profitability of IRAS companies is larger than that of GGAAP companies. Although this result is consistent with the alternative hypothesis, it may not be enough to conclude that there is a significant relationship between profitability and the choice of IRAS or GGAAP, especially as it is not even confirmed by the univariable model (see Table 7.25). Furthermore, the results of ANOVA and Kruskal-Wallis indicate that profitability can be an important factor in choosing between IAS and USGAAP (yet, this is the concern of Chapter 8).

The case of **listing abroad** is very similar to that of free float. The null hypothesis that listing status is not associated with the choice between IRAS and USGAAP (or negatively related) is rejected by all types of analysis. However, the variable LIST is not included in the adopted model (Main model). The reason is that it is masked by the size variable (ORASSET). It was explained earlier that the vast majority of multi-listed companies are large. One can say the multi-listed firms are a small subset of large firms (but the opposite is not true). This is also reflected in a positive significant correlation between the two variables. Therefore, the variable LIST becomes redundant when used with size variables in the same model. The reasons which may lead German companies listed abroad to prefer IRAS to GGAAP are discussed in Chapter 5. In general, it can be stated that German multi-listed companies consider IRAS as more investor-oriented and useful as an international accounting language to communicate with investors and other interested parties abroad.

Still, one should be aware of the fact that many of the multi-listed companies are listed in the US. The percentage of firms using US GAAP in the multi-listed companies using IRAS is 36% (27% of the multi-listed companies including GGAAP companies). Although this percentage appears to be important, we cannot draw any conclusions from this. Dumontier and Raffournier (ibid) find similar results on the listing status of Swiss firms, although they do not discuss the fact that a high percentage of their multi-listed companies are also listed on NYSE. Cuijpers et al (ibid) also find that the number of foreign listings is an important factor in choosing non-local GAAP.

Several hypotheses are introduced to link the internationality of a firm with its tendency to adopt IRAS.

The null hypothesis on the presence of **foreign investors** among the firms' shareholders is accepted through the univariable and bivariable analysis. However, it can be significant when included in a multivariable model that controls for SEGMENT (a suppressor variable). The reason that SEGMENT works as a suppressor for FORINVES is the significant negative relationship between them. This may imply that there are companies with foreign investors which tend to use IRAS although they are Unclassified (this was confirmed through the use of crosstabulation after excluding classified firms).

Still, one cannot conclude that this variable is an important factor in predicting the use of IRAS because the model, in which it is significant, does not control for all important variables. This may not be totally consistent with the findings of Weißenberger et al (2004), who conclude the one of the important motives leading German companies to adopt IRAS is the diversification and internationalisation of the body of investors. However, one should bear in mind that Weißenberger et al mean the aim of diversifying investors and not the presence of international investors. Yet, the hypothesis on foreign investors is not commonly tested, and hence there are not many results to be compared with those presented here.

Conversely, the null hypothesis on the presence of **foreign managers** on either the supervisory board or the management board is rejected all levels of analysis including the multivariable model. This variable was intended to proxy for the impact of foreign investors. However, the frequency distributions in Table 7.3 show that the number of companies with foreign managers (102) is much larger than those with foreign investors (83). This clearly suggests that the presence of foreign investors is not the main reason of the presence of foreign managers. Further analysis indicates that having a foreign subsidiary may be the main factor behind this. A crosstabulation between FORMAN and FORSUB shows that 90.2 % of the companies that have foreign managers have subsidiaries abroad (see also a positive significant correlation in Table 7.4). This can be related to the fact that foreign managers may be important in managing foreign subsidiaries. The relative importance of particular subsidiaries in particular countries may require good experience of business in these countries, which can only (at best) be provided by foreign managers. The possible explanation is that FORMAN is a significant factor only because it is a proxy for international business. Therefore, the explanations provided to justify the internationality hypothesis in Chapter 5 should be employed here to justify this significant result on foreign management. Moreover, based on this assumption, FORMAN can be a better proxy than FORSUB for the impact of foreign business. This is because the presence of foreign managers on the supervisory board or the management board may be an indication of the importance of the foreign subsidiaries. Therefore, the tendency to use IRAS may be more in these firms than those with foreign subsidiaries, but without foreign managers.

Yet, the variable that is basically used to proxy for internationality is **FORSUB**. The null hypothesis on having a foreign subsidiary is rejected through bivariable analysis

at .01. but only at a marginal level (.08) in the multivariable analysis. This variable was used as an alternative to the proportion of international sales, because of missing data. This result indicates that German listed companies that have at least one subsidiary abroad are more likely to be using IRAS. From the explanations provided in Chapter 5 on this hypothesis, these companies need to use IRAS to provide standardised information to different stakeholders in the countries in which these subsidiaries are established. Although, FORSUB is marginally significant when included in the adopted model, it is excluded because it seems to be redundant. Therefore, the researcher chose to keep only one variable in the model to proxy for internationality, which is FORMAN. The result for FORSUB (if included in the model) indicates that having at least one subsidiary abroad by a German listed firm increases the odds of complying with IRAS by a factor of 1.813.

One of the significant factors included in the adopted Main model is **AUDID** which indicates whether a company has a Big-5 auditor or not. All the statistical results presented above support the rejection of the null hypothesis, proving that German companies that have a Big-5 auditor have a greater tendency to use IRAS. One of the explanations for this is that the big auditors are important mediators in the introduction of Anglo-Saxon accounting (IRAS) to German companies which are familiar with an entirely different model. Their importance is related to the fact that they originate largely in those countries where the Anglo-Saxon model has been developed. Apart from this, big auditors may be protecting their reputation by advising clients and supporting them in the use of accounting standards which are known to be of high quality. Becker, DeFond, Jiambalvo and Subramanyam (1998, p.8), argue the larger client base of the Big-6 means that they have more to lose in the event of a loss of reputation. "This larger potential loss results in a relatively greater incentive to be independent compared to non-Big Six firms that have a much smaller client base". Furthermore, there is substantial evidence in the literature that Big auditors play an important role in restricting earnings management (Becker et al ibid.; Gore, Pope and Singh, 2001). It may be much easier and more practical for the Big-auditors to market IRAS, which reduce the chances of earnings management, to their clients than monitoring and restricting their practices under GGAAP, which has larger options for smoothing income. Finally, one should also consider the possibility that companies using IRAS or planning to use them are more likely to employ Big-auditors, which are most likely to have the best expertise in

implementing and maintaining IRAS Signalling theory may also provide a good explanation for the positive impact of Big-5 auditors in German companies, which may be signalling that they are using the best expertise in this field (more discussion is provided in Chapter 8).

Not many studies in the literature of accounting choice examine this factor and hence no results are available for comparison purposes. Dumontier and Raffournier (ibid) find the auditor type is a significant variable, but only in the results of the univariate analysis and not in the multivariate analysis. Still, the authors do not provide any explanation for this result.

Finally, in general, the results on the industry hypothesis failed to establish a significant relationship between being in a specific industry sector and the choice of IRAS. However, as presented earlier, the results of chi-square shows that being in PANDC (P&C) is significantly related with choosing IRAS at 0.05, and that being in the UANDT (U&T) is marginally significant with choosing IRAS at 0.10. Further analysis shows that 93 % of P&C companies using IRAS are in quality segments (only one firm is unclassified). Furthermore the majority of them have subsidiaries abroad and Big-5 auditors. These three factors explain the significance of using IRAS in this particular sector. The same factors seem to be significant in the U&T sector, in which all the companies using IRAS have Big-5 auditors. Moreover, all of them (except one) are in quality segments. This clearly explains the fact that controlling for these factors in a multivariable model cause P&C and U&T to be insignificant. In other words, the clear confound between industry sectors and other firms characteristics such as size, internationality and the auditor, makes the industry variables appear less significant in choosing GAAP.

The result on industry type in the current research are not consistent with the results of the survey study by Weißenberger et al (2004), who find that comparability with industry peers is one of the motives which leads German firms to comply with IRAS. This can be typified as the so-called "herding effect". However, apparently this effect is not evident in our analysis where companies in each sector do not show a tendency to adopt a particular GAAP (except for P&C and U&T, which are discussed above).

As can be seen in Chapter 8 industry type is significant in the choice between IAS and US GAAP (discussed in Chapter 8).

8 Chapter 8: Choice between IAS and US GAAP

8.1 Introduction:

This chapter is devoted to analyzing the choice between IAS and US GAAP. This choice takes place both in the Main Market and the Neuer Markt: although in the Neuer Markt companies should choose one of these two sets. Therefore, the analysis will undertake two parallel investigations by analyzing the choice in each of these markets. As explained in earlier chapters, only the Main Market companies that use IRAS are included in this chapter. These companies will be referred to as "Main Market IRAS subsample".

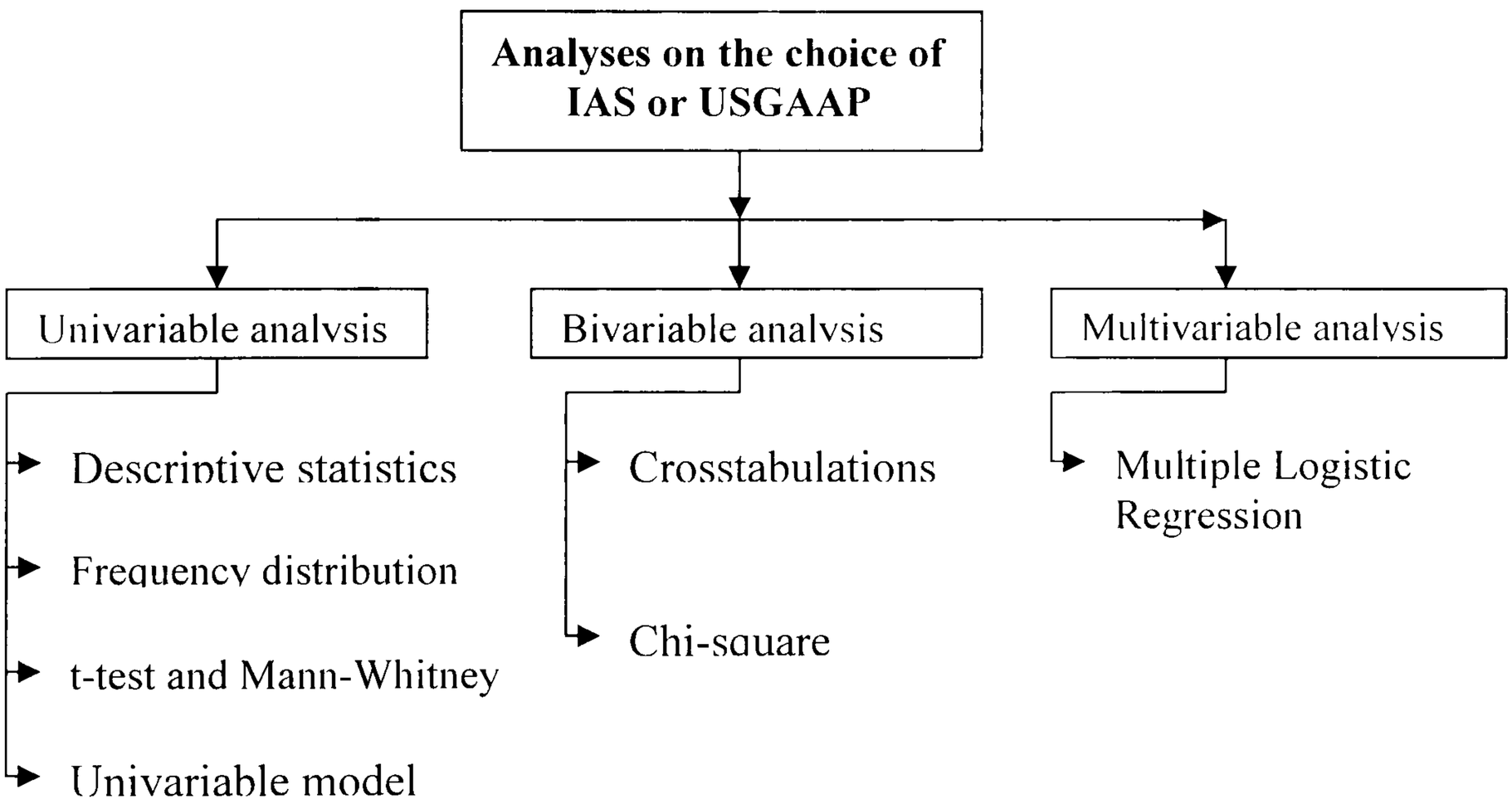

Figure 8.1: Analysis design for the choice between IAS and US GAAP both in the Neuer Markt and the Main Market

8.2 Descriptive statistics for continuous variables:

As in the results for the Main Market, Table 8.1 and 8.2 present a group of descriptive statistics for the continuous variables. From Table 8.1, it can be seen that none of the variables of the Neuer Markt is normally distributed, whereas Table 8.2 shows that only two variables in the Main Market subsample are normally distributed. Furthermore, these tables show the significance of the outliers[346], which

[346] Defined in Section 7.2.1.1

is reflected in big changes in the maximum values and in the mean values as a result of removing them.

Table 8.1: Descriptive statistics of the continuous variables in the Neuer Markt

Variable	Unit	Min	Max	Mean	Range	25th	50th	75th	N. test[347]
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	Sig.
EMPNO	Person	19	6214	478	6195	138	248	522	No (.000)
EMPNO exc. Outliers[348]		19	1066	295	1047	128	227	382	No (.000)
TOASSET	€ Mio	3.7	11031	147.2	11027	30.1	52.7	129.4	No (.000)
TOASSET exc outliers		3.7	277.9	72.8	274.2	29.2	49	101.5	No (.000)
TURNOV	€ Mio	0.8	2590	102.7	2589	16.6	34.9	116.2	No (.000)
TUROV exc. Outliers		0.8	243.4	58.7	242.7	16.0	32.1	83.2	No (.000)
PROFIT1	%	-176	110	-21	285	-32	-10	2.6	No (.000)
PROFIT1 exc. Outliers		-78.8	29.8	-12.9	108.6	-26.4	-7.9	3.0	No (.000)
LEVER1	%	1.5	93	31.2	91	15.6	26.4	45.8	No (.000)
LEVER1 exc. Outliers		1.5	81.1	30.9	74	15.3	26.2	45.0	No (.000)
FRFLOAT	%	1	100	42	99	29.6	37	47.6	No (.002)
FRFLOAT exc outliers		1	74	39.7	63	29.2	35.7	45.0	No (.002)
MAN1	%	0	76.5	25.8	76.5	3.9	21.3	45.5	No (.000)
MAN2, 3[349]	%	0	82	31.1	82	10.2	30.5	50.4	No (.006)
PROFIT1	%	-176	110	-21	285	-32	-10	2.6	No (.000)
PROFIT1 exc. outliers		-78.8	29.8	-12.9	108.6	-26.4	-7.9	3.0	No (.000)
PROFIT2	%	-1303	64.4	-56.6	-1367	-58	-15.4	2.4	No (.000)
PROFIT2 exc. Outliers		-134.5	64.4	-20.7	199	-40.0	-9.8	3.1	No (.000

Variables as defined below Table 8.5

Table 8.2: Descriptive statistics of continuous variables in the Main Market (IRAS subsample)

Variable	Unit	Min	Max	Mean	Range	25th	50th	75th	Normality
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
EMPNO	Person	15	477100	40629	477085	777	6187	34432	No (.000)
EMPNO exc. Outliers		15	78608	12828	78593	570	3597	15947	No (.000)
TOASSET	€ Mio	4	207410	12659	207407	123	905	6949	No (.000)
TOASSET exc outliers		4	16624	2285	16621	105	633	3279	No (.000)
TURNOV	€ Mio	0	152873	9897	152873	143	1042	6852	No (.000)
TUROV exc. Outliers		0	16748	2849	16748	118	697	3642	No (.000)
LEVER1	%	6.8	91.3	45.5	84.5	32.3	43.7	57.5	Yes (.200)
FRFLOAT	%	0	100	41.5	100	21.8	40.1	61.7	Yes (.195)
PROFIT1	%	-77.8	31.6	1.8	109.4	0.9	3.3	7.9	No (.000)
PROFIT1 exc. outliers		-9.5	17.3	4.3	26.8	1.8	3.4	7.7	Yes (.200)
PROFIT2	%	-1184	42	-9.3	1226	0.8	3.5	9.3	No (.000)
PROFIT2 exc. outliers		-11.7	19	4.3	30.7	1.3	3.5	8.4	Yes (.200)

Variables as defined below Table 8.5

[347] Results of Kolmogorov-Smirnov (probabilities indicate how significantly different from normality the distribution from each variable)
[348] Descriptive statistics after excluding outliers
[349] The two variables are nearly the same

8.2.1 *Frequency distribution for the continuous variables:*

Continuous variables are broken down into intervals to study their frequency distribution. The size variables are categorized differently from the Main Market, where these variables contain larger number of extreme values and outliers[350].

Table 8.3: Frequency distribution over the categories of continuous variables

Variable	Neuer Markt				Main Market subsample			
	Interval	Level	Freq.	%	Interval	Level	Freq.	%
OR-EMPNO (Employees number)	> 717	Large	42	17.2	> 39013	Large	19	21.1
	368-717	Med	41	16.8		Med	23	25.6
	<368	Small	161	66.0	< 7551	Small	48	53.3
			244	100			90	100.0
OR-ASSETS (Total assets) € Mio	> 186.5	Large	33	13.5	> 8040	Large	20	22.2
	95.1-186.5	Med	49	20.1	1405-8040	Med	23	25.6
	< 95.1	Small	162	66.4	< 1405	Small	47	52.2
			244	100.0			90	100.0
OR-TURNOV (Turnover) € Mio	> 162.5	Large	38	15.6	> 8829	Large	19	21.1
	81.7-162.5	Med	37	15.2	1528-8829	Med	23	25.6
	< 81.7	Small	169	69.3	< 1528	Small	48	53.3
			244	100.0			90	100.0
OR-LEVER (Leverage)	> 0.625	High	20	8.2	> 0.63	High	13	14.4
	0.32-0.625	Med	87	35.7	0.35–0.63	Med	51	56.7
	< 0.32	Low	137	56.1	< 0.35	Small	26	28.9
			244	100.0			90	100.0
OR-PROFIT1[351] (Profitability 1)	< 6.8 %	High	27	11.1	> 5.8 %	High	31	34.4
	0 – 6.8	Low	58	23.8	0 – 5.8 %	Low	39	43.3
	< 0	U.P	159	65.2	< 0.0	U. P	20	22.2
			244	100.0			90	100.0
OR-PROFIT2 (Profitability 2)	> 7.8 %	High	32	13.1	> 6.1 %	High	33	36.7
	0.0 - 7.8 %	Low	53	21.7	0 – 6.1 %	Low	37	41.1
	< 0	U. P	159	65.2	< 0.0	U. P	20	22.2
			244	100.0			90	100.0
ORFRFLOAT2 (Free float)	> 0.44	High	80	32.8	> 50.7	High	28	31.1
	0.25 – 0.44	Med	141	57.8	0.2 – 50.7	Med	43	47.8
	< 0.25	Low	23	9.4	< 0.20	Low	19	21.1
			244	100.0			90	100.0
OR-MAN1	> 51 %	High	43	17.6		X		
	25.5 – 51	Med	66	27.0		X		
	< 25.5 %	Low	135	55.3		X		
			244	100.0		X		
OR-MAN2, 3	> 54.4 %	High	46	18.9		X		
	27.2 –54.4	Med	83	34.0		X		
	< 27.2 %	Low	114	46.7		X		
			243	99.6		X		

[350] Size variables in the Neuer Markt are categorised by creating three equal intervals after removing outliers. Outliers then were added back to the highest interval. In the Main Market, on the other hand, outliers were isolated in one group, which is the category "High".
[351] Profitability and free float variables are categorised in a similar way to the Main Market

8.2.2 *Frequency distribution of binary variables:*

The information presented in Table 8.4 is also presented in the contingency tables later in this chapter (crosstabulations), although in a different way. Hence, there is no need for any comments on this table.

Table 8.4: Frequency distribution of binary variables

Variable:		**Neuer Markt**			**Main Market (IRAS)**	
		Freq.	%		Freq.	%
AUDID Has a Big-5 auditor	YES	126	51.6	YES	66	73.3
	NO	118	48.4	No	24	26.7
		244	100		90	100.0
FORSUB Has a foreign subsidiary	YES	202	82.8	YES	81	90
	NO	42	17.2	NO	9	10
		244	100		90	100.0
USSUB Has a US subsidiary	YES	121	49.6	YES	62	68.9
	NO	123	50.4	NO	28	31.1
		244	100		90	100.0
FORINVES2 Has Foreign investors	YES	48	19.7	YES	28	31.1
	NO	196	80.3	NO	62	68.9
		244	100		90	100.0
USINVES2 Has US investors	YES	16	6.6	YES	4	4.4
	NO	228	93.4	NO	86	95.6
		244	100		90	100.0
FOR-MAN Has foreign managers	YES	60	24.6	YES	41	45.6
	NO	184	75.4	NO	49	54.4
		244	100			100.0
US-MAN Has US managers	YES	27	11.1	YES	13	14.4
	NO	217	88.9	NO	77	85.6
		244	100		90	100.0
Listing Status Listing abroad				YES	22	24.4
				NO	68	75.6
					90	100.0

8.3 Correlation Matrix:

Table 8.5 below presents a correlation matrix for all the variables used in the analysis on the Neuer Markt. One of the significant findings in this the matrix is that the three size variables are not as highly correlated with each other as in the Main Market Furthermore, each of them has a different relationship with the other variables (this observation is further discussed below).

There is also a significant negative correlation between free float and all the management ownership variables, which is similar to that found in the Main Market (for MAN2 and MAN3 but not MAN1[352]). This means that free float is negatively related with the proportion held by management (including families, in MAN2 and MAN3). In other terms, one can say that a low proportion of equity owned by management implies a high percentage of free float. This is consistent with Leuz (2003) who uses the free float as an inverse proxy for the presence of insiders.

Furthermore, leverage is negatively correlated with profitability. This result is consistent with the financial literature in that the two ratios are negatively related (Chen and Zhao, 2004).

As in Chapter 7, the correlation matrix is mainly prepared as a background that may help in explaining the results of the statistical analysis run later in this chapter.

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[352] MAN1 in the Main Market is positively related with free float.

Table 8.5: Correlation Matrix for all Neuer Markt variables

	EMPNO	ASSETS	TURNOV	LEVERAGE	PROFIT1	PROFIT2	FREFLOAT	MAN1	MAN2	MAN3	AUDITOR
EMPNO	**1.000**										
TOASSET	**0.383**										
TURNOV	**0.549**	**0.688**									
LEVER	**0.213**	**0.146**	**0.325**								
PROFIT1	0.076	**0.297**	**0.252**	**-0.138**							
PROFIT2	**0.175**	**0.131**	**0.346**	0.079	**0.699**						
FREFLOAT	-0.064	0.026	0.080	-0.010	0.078	0.053					
MAN1	-0.032	-0.094	-0.015	**0.170**	0.022	0.046	**-0.341**				
MAN2	-0.016	**-0.143**	-0.064	**0.128**	0.009	0.035	**-0.360**	**0.862**			
MAN3	-0.025	**-0.162**	-0.082	0.104	-0.009	0.025	**-0.370**	**0.800**	**0.949**		
AUDID	**0.248**	**0.223**	0.085	-0.010	-0.011	-0.049	-0.020	-0.112	**-0.173**	**-0.156**	
USMAN	-0.069	**0.127**	-0.019	-0.066	-0.009	-0.018	-0.040	-0.116	**-0.122**	-0.087	**0.124**
USSUB	**0.234**	**0.252**	**0.152**	0.021	0.075	0.068	0.080	-0.060	-0.089	-0.078	**0.218**
USINVS	-0.074	**0.143**	-0.004	-0.006	-0.072	**-0.151**	**-0.094**	-0.072	-0.116	**-0.130**	0.098
TECHNO	0.001	**0.169**	**0.269**	0.080	**0.168**	**0.228**	**0.133**	**-0.121**	**-0.175**	**-0.206**	-0.086
TELECOM	-0.066	-0.104	-0.071	-0.108	-0.076	-0.093	-0.077	-0.051	0.029	0.030	**-0.122**
PHARMA	**-0.131**	0.020	**-0.187**	-0.098	0.044	**-0.205**	0.080	-0.090	-0.038	-0.056	0.082
SOFTWARE	**0.150**	**-0.229**	**-0.105**	**-0.165**	**-0.215**	-0.090	**-0.134**	**0.138**	**0.141**	**0.181**	0.071
MEDIA	**-0.186**	**0.164**	-0.031	**0.209**	0.008	-0.024	-0.034	0.084	0.048	0.040	-0.004
OTHER	0.050	0.114	**0.245**	0.090	**0.191**	**0.235**	0.113	**-0.145**	**-0.156**	**-0.181**	**-0.121**

Note: **bold** typeface indicates a statistically significant correlation at the 0.05 level.

Table 8.5: continued

	USMAN	USSUB	USINVS2	TECHNO	TELECOM	PHARMA	SOFTWARE	MEDIA
EMPNO								
TOASSET								
TURNOV								
LEVER								
PROFIT1								
PROFIT2								
FREFLOAT								
MAN1								
MAN2								
MAN3								
AUDID								
USMAN								
USSUB	**0.286**							
USINVS	**0.556**	0.101						
TECHNO	0.025	**0.173**	-0.007					
TELECOM	-0.075	**-0.168**	-0.057	**-0.122**				
PHARMA	**0.160**	**0.187**	0.054	**-0.182**	-0.070			
SOFTWARE	-0.051	**-0.140**	0.014	**-0.497**	**-0.190**	**-0.283**		
MEDIA	0.019	-0.031	0.028	**-0.208**	-0.079	**-0.118**	**-0.323**	
OTHER	-0.058	0.052	-0.066	**0.769**	**0.293**	**-0.237**	**-0.647**	**-0.270**

Note: **bold** typeface indicates a statistically significant correlation at the 0.05 level.
EMPNO: employees' numbers, TOASSET: total assets, TURNOV: turnover, LEVER: total debt (long-term debt +short-term debt)/ total assets, PROFIT1: profits before tax to total assets, PROFIT: profit before tax to turnover, FREFLOAT: the percentage of equity offered for the public (not held by permanent shareholders), MAN1: percentage of equity held by managers, MAN2: percentage of equity held by managers and family members (have their names on the boards), MAN3: percentage of equity of held by managers and family (regardless whether family members are on the boards or not), USSUB: whether a company has a subsidiary in the US or not, AUDID: whether a company have a Big-5 auditor or not, USINVES: whether a company has US investors or not, USMAN: whether a company

has US managers on the boards or not, TECHNO: whether a company is classified as 'Technology' or not, TELECOM: whether a company is classified as 'Telecom' or not, PHARMA: whether a company is classified as 'Pharmaceuticals' or not, SOFTWARE: whether a company is classified as 'Software' or not, MEDIA: whether a company is classified as 'Media', Other: all sectors with very small frequencies (see Chapter 6).

8.4 Crosstabulation and Chi-square test:

The following is a group of contingency tables that investigate the relationship between the choice of IAS or US GAAP and all the variables used in this study including the continuous ones. As in Chapter 7, the chi-square test is run for each table. Although continuous variables are mainly tested by the t test and Mann-Whitney test below, they can also be tested through crosstabulations and chi-square test[353]. As mentioned above, analyses include the choice both in the Neuer Markt and the Main Market.

Small frequencies: it is explained in Chapter 6, that a chi-square test based on contingency tables in which 20% or more of expected frequencies are less than 5, cannot be interpreted. Therefore, Yates' correction is used to treat such cases. This problem appeared in the contingency tables for SEGMENT, USINVES, USMAN and INDUS1 (see below). Still, this observation is only found in the tables of the Main Market variables (IRAS subsample).

8.4.1 Crosstabulations and chi-square test of the categorized continuous variables:

8.4.1.1 Size:

8.4.1.1.1 Size in the Neuer Markt:

The relationship between size and the choice of GAAP is examined through the contingency tables for three size variables, employee numbers, total assets and turnover, after being categorized. From Table 8.6, it can be seen that the majority of the Neuer Markt firms are classified as Small. The rest of these firms are equally split between "Medium" and "Large". Yet, the table does not show any important differences between the distribution patterns of IAS companies and US GAAP companies over the three categories of size.

The highly insignificant chi-square statistics indicate that there is no relationship between the categories of size in the Neuer Markt and their choice of GAAP.

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[353] Categorization schemes are explained in Chapter 6.

Table 8.6: Categories of size and choice between IAS and US GAAP in the Neuer Markt

	Small	**Medium**	**Large**	**Total**
Group / EMPNO	**< 368 person**	**368 - 717**	**> 717**	
IAS	92	22	20	134
	68.7 %	16.4 %	14.9 %	100.0 %
US GAAP	69	19	22	110
	62.7 %	17.3 %	20.0 %	100.0 %
Total	161	41	42	244
	66.0 %	16.8 %	17.2 %	100.0
$\chi^2 = 1.252$				P = .535
Group / ASSET	**< € 95.1 Mio**	**95.1 – 186.5**	**> 186.5**	
IAS	88	28	18	134
	65.7 %	20.9 %	13.4 %	100.0 %
US GAAP	74	21	15	110
	67.3 %	19.1 %	13.6 %	100.0 %
Total	162	49	33	244
	66.4 %	20.1 %	13.5 %	100.0
$\chi^2 = 0.123$				P = .942
Group/ TURNOV	**< € 81.7 Mio**	**81.7 – 162.5**	**> 162.5**	
IAS	90	22	22	134
	67.2 %	16.4 %	16.4 %	100.0 %
US GAAP	79	15	16	110
	71.8 %	13.6 %	14.5 %	100.0 %
Total	169	37	38	244
	69.3 %	15.2 %	15.6 %	100.0
$\chi^2 = 0.633$				P = .729

Variables as defined below Table 8.5

8.4.1.1.2 Size in the Main market (IRAS subsample):

As in the analysis of the Neuer Markt above, the three size variables in Main Market companies that use IRAS have very similar distributions. Furthermore, Table 8.7 below shows that the distribution patterns of IAS and US GAAP companies are not significantly different from each other. This observation is confirmed by the chi-square test which produced insignificant results.

Table 8.7: Categories of size and the choice between IAS and US GAAP in the Main Market (IRAS subsample)

	Small	**Medium**	**Large**	**Total**
Group / EMPNO	**< 7551 person**	**7551-39013**	**> 39013**	
IAS	38	16	13	67
	56.7 %	23.9 %	19.4 %	100.0 %
US GAAP	10	7	6	23
	43.5 %	30.4 %	26.1 %	100.0 %
Total	48	23	19	90
	53.3 %	25.6 %	21.1 %	100.0 %
$\chi^2 = 1.213$				P = .545
Group / ASSET	**< € 1405 Mio**	**1405 – 8040**	**> 8040**	
IAS	37	16	14	67
	55.2 %	23.9 %	20.9 %	100.0 %
US GAAP	10	7	6	23
	43.5 %	30.4 %	26.1 %	100.0 %
Total	47	23	20	90
	52.2 %	25.6 %	22.2 %	100.0 %
$\chi^2 = 0.948$				P = .623
Group/ TURNOV	**< € 1528 Mio**	**1528 – 1528**	**> 8829**	
IAS	39	15	13	67
	58.2 %	22.4 %	19.4 %	100.0 %
US GAAP	9	8	6	23
	39.1 %	34.8 %	26.1 %	100.0 %
Total	48	23	19	90
	53.3 %	25.6 %	21.1 %	100.0 %
$\chi^2 = 2.560$				P = .278

Variables as defined below Table 8.5

8.4.1.2 Leverage (LEVER):

8.4.1.2.1 Leverage in the Neuer Markt:

According to Table 8.8 below, the percentage of US GAAP companies in the category Low is substantially larger than that of the IAS companies in the same category. In the category Medium, on the other hand, IAS companies have a larger percentage than that of US GAAP companies. This distribution implies that companies using US GAAP have lower leverage than those using IAS. In other words, leverage is negatively associated with using US GAAP. According to the results of the chi-square test, this relationship is significant at .01.

Table 8.8: Categories of leverage and choice between IAS or US GAAP in the Neuer Markt

Group / Leverage	**Low** **< 0.32**	**Medium** **0.32 – 0.625**	**High** **> 0.625**	**Total**
IAS	65 48.5 %	59 44.0 %	10 7.5 %	134 100.0 %
US GAAP	72 65.5 %	28 25.5 %	10 9.1 %	110 100.0 %
Total	137 56.1 %	87 35.7 %	20 8.2 %	244 100.0 %
$\chi^2 = 9.131$				P = .010

8.4.1.2.2 Leverage in the Main Market (IRAS subsample):

Unlike in the Neuer Markt, Table 8.9 shows that there is no important difference between the distribution patterns of IAS and US GAAP companies. Still the proportion of companies using IAS in the category "High" is nearly double the proportion of US GAAP companies in the same category. This implies that leverage in IAS companies is higher than in US GAAP companies. To some extent, this observation seems to be consistent with the result in the Neuer Markt above. However, the relationship between leverage and the GAAP choice is insignificant as indicated by the chi-square test.

Table 8.9: Categories of leverage and choice between IAS and US GAAP in the Main Market.

Group / Leverage	**Low** **< 0.35**	**Medium** **0.35 – 0.63**	**High** **> 0.63**	**Total**
IAS	19 28.4 %	37 55.2 %	11 16.4 %	67 100.0 %
US GAAP	7 30.4 %	14 60.9 %	2 8.7 %	23 100.0 %
Total	26 28.9 %	51 56.7 %	13 14.4 %	90 100.0 %
$\chi^2 = 0.829$				P = .661

8.4.1.3 Profitability:

8.4.1.3.1 Profitability in the Neuer Markt:

In the sample year, the majority of the Neuer Markt companies had losses. Table 8.10 shows that IAS companies and USGAAP companies have very similar distribution patterns over the categories of profitability. Therefore, the chi-square statistic was highly insignificant and shows that is there is no relationship between

profitability and the choice between IAS and USGAAP. The other measure of profitability PROFIT2 produces similar results.

Table 8.10: Categories of profitability and choice between IAS and US GAAP in Neuer Markt

Group / PROFIT1	**Unprofitable** **< 0**	**Low** **0 - 6.8 %**	**High** **> 6.8 %**	**Total**
IAS	88	32	14	134
	65.7 %	23.9 %	10.4 %	100.0 %
US GAAP	71	26	13	110
	64.5 %	23.6 %	11.8 %	100.0 %
Total	159	58	27	244
	65.2 %	23.8 %	11.1 %	100.0 %
$\chi^2 = .116$				P = .944

Variables as defined below Table 8.5

8.4.1.3.2 Profitability in the Main Market (IRAS subsample):

From Table 8.11, one can see that, although profitability has a slightly different distribution pattern from that in the Neuer Markt, differences between the proportions of companies using IAS and those using USGAAP in the three categories are not significant (nearly equal proportions in the category "High").

Table 8.11: Categories of profitability and choice between IAS and US GAAP in Main Market

Group / PROFIT1	**Unprofitable** **< 0**	**Low** **0 - 5.8 %**	**High** **> 5.8 %**	**Total**
IRAS	14	30	23	67
	20.9 %	44.8 %	34.3 %	100.0 %
US GAAP	6	9	8	23
	26.1 %	39.1 %	34.8 %	100.0 %
Total	20	39	31	90
	22.2 %	43.3 %	34.4 %	100.0 %
$\chi^2 = 0.335$				P = .846

8.4.1.4 Free Float (FREFLOAT):

8.4.1.4.1 Free Float in the Neuer Markt:

As shown in Table 8.12, the majority of both IAS and USGAAP companies are classified as having a medium level of free float. The next highest proportions of the two groups are classified as "High". Overall the groups IAS and US GAAP are distributed over the categories of free float nearly in the same pattern. As a result of this, the chi-square statistic was small and insignificant. This, in turn, means that there is an insignificant relationship between the free float in the Neuer Markt companies and their choice between IAS and USGAAP.

Table 8.12: Categories of free float and choice of IAS and US GAAP in Neuer Markt

Group / FRFLOAT	**Low** **< 0.25**	**Medium** **0.25 – 0.44**	**High** **> 0.44**	**Total**
IAS	10 7.5 %	78 58.2 %	46 34.3	134 100.0 %
US GAAP	13 11.8 %	63 57.3	34 30.9 %	110 100.0 %
Total	23 9.4 %	141 57.8	80 32.8 %	244 100.0 %
$\chi^2 = 1.440$				P = .487

Variables as defined below Table 8.5

8.4.1.4.2 Free Float in the Main Market (IRAS subsample):

Unlike in the Neuer Markt, the IAS companies in the Main Market are distributed over the categories of free float differently from USGAAP companies. Table 8.13 shows that whereas a big majority of the US GAAP companies are classified as having "High" free float, a similar percentage of IAS companies are classified as having "Medium" free float. This distribution implies that free float is higher in the companies using USGAAP than in companies using IAS. The chi-square test confirms that this relationship is significant at 0.001.

Table 8.13: Categories of free float and choice between IAS and US GAAP in Main Market

Group / FRFLOAT	**Low** **< 0.20**	**Medium** **0.20 – 0.51**	**High** **> 0.51**	**Total**
IAS	14 20.9 %	39 58.2	14 20.9 %	67 100.0 %
US GAAP	5 21.7 %	4 17.4 %	14 60.9 %	23 100.0 %
Total	19 21.1 %	43 47.8 %	28 31.1 %	90 100.0 %
$\chi^2 = 14.771$				P = .001

8.4.1.5 Management ownership:

8.4.1.5.1 Management ownership in the Neuer Markt:

In the previous chapter, the variables representing management ownership were transformed into binary variables because of the large number of companies with zero values. This observation does not apply to the Neuer Market data. Therefore, the management ownership variables will be left in their continuous form. However, for the purpose of chi-square analysis, they are transformed into three categories to make them testable.

Results of MAN2 and MAN3 are presented in one table because their results are nearly the same. According to Table 8.14, IAS and USGAAP companies are distributed in similar proportions over the categories of MAN1. However, in the case of MAN2 and MAN3, the proportional distribution of the IAS group is different from that of the USGAAP group. This difference exists in the category "Low", where USGAAP companies seem to have a larger proportion than IAS companies. Yet, the chi-square statistic is not significant.

Table 8.14: Categories of Management ownership and choice between IAS and US GAAP in Main Market

Group / MAN1	**Low** **< 25.5 %**	**Medium** **25.5% - 51%**	**High** **> 51%**	**Total**
IAS	73	35	26	134
	54.5 %	26.1 %	19.4 %	100.0 %
US GAAP	62	31	17	110
	56.4 %	28.2 %	15.5 %	100.0 %
Total	135	66	43	244
	55.3 %	27.0 %	17.6 %	100.0 %
$\chi^2 = 0.668$				P = .716
Group/ MAN2, MAN3	**< 27.2%**	**27.2%-54.4%**	**>54.4%**	**Total**
IAS	57	48	29	134
	42.5 %	35.8 %	21.6 %	100.0 %
US GAAP	57	35	17	110
	52.3	32.1 %	15.6 %	100.0 %
Total	114	83	46	244
	46.9 %	34.2 %	18.9 %	100.0 %
$\chi^2 = 2.622$				P = .270

Variables as defined below Table 8.5

8.4.2 Crosstabulations and chi-square for binary variables:

8.4.2.1 Management ownership in the Main Market (IRAS subsample):

The variable representing management ownership in the Main Market is different from that in used in the Neuer Markt, because it is a binary variable[354]. Therefore, it is not possible to compare results. Table 8.15, shows that in terms of MAN1 (whether managers own shares in the firm or not), differences between the two groups are not clear.

In terms of MAN2 and MAN3 (including family ownership[355]), differences are larger. The frequency of management ownership is larger in USGAAP companies

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[354] As explained in Chapter 7, this transformation is because of the large number of zero values.

[355] In MAN2, management ownership includes the ownership of families that have members on the supervisory board or the management board. In MAN3, on other hand, family ownership is

than in IAS companies. However. these differences are not statistically significant as indicated by the chi-square test.

Table 8.15: Categories of management ownership and choice between IAS and US GAAP in The Main Markt

Group / MAN1	**YES**	**NO**	**Total**
IAS	22	45	67
	32.8 %	67.2 %	100.0 %
US GAAP	8	15	23
	34.8 %	65.2	100.0 %
Total	30	60	90
	33.3 %	66.7 %	100.0 %
$\chi^2 = 0.029$			P = .864

Group/MAN2, MAN3[356]	**YES**	**NO**	**Total**
IAS	29	38	67
	43.3 %	56.7 %	100.0 %
US GAAP	12	11	23
	52.2 %	47.8 %	100.0 %
Total	41	49	90
	45.6 %	54.4 %	100.0 %
$\chi^2 = 0.546$			P =.460

Variables as defined below Table 8.5

8.4.2.2 Auditor identity (AUDID):

8.4.2.2.1 Auditor identity in the Neuer Markt:

According to Table 8.16, just above half the companies in the Neuer Markt are with a Big-5 auditor. Yet, whereas the majority of USGAAP companies have Big 5 auditors, it is the opposite for companies using IAS. This implies that companies that are audited by Big-5 firms are more likely to be using USGAAP. The relationship between the two variables is significant at .001.

Table 8.16: Auditor identity and choice between IAS and US GAAP in the Neuer Markt

Group / Big-5	**YES**	**NO**	**Total**
IAS	53	81	134
	39.6 %	60.4 %	100.0 %
US GAAP	73	37	110
	66.4 %	33.6 %	100.0 %
Total	126	118	244
	51.6 %	48.4 %	100.0 %
$\chi^2 = 17.387$			P = .000

considered as management ownership regardless they have members on the supervisory or the management board or not.

[356] Results of these two variables are very similar, so that one table can represent them.

8.4.2.2.2 Auditor identity in the Main Market (IRAS subsample):

Table 8.17 shows that a substantial majority of both IAS and USGAAP companies have a Big-5 auditor. However, the percentage of USGAAP companies that have Big-5 auditor is larger than that of the IAS firms (a difference of 12.5 % points). Although this seems to be consistent with results of the Neuer Markt above and with our expectation, these proportional differences are not significant (insignificant chi-square statistic).

Table 8.17: Auditor identity and choice between IAS and US GAAP in Main Market

Group / Big-5	YES	NO	High
IAS	47	20	67
	70.1 %	29.9 %	100.0 %
US GAAP	19	4	23
	82.6 %	17.4 %	100.0 %
Total	66	24	90
	73.3 %	26.7 %	100.0 %
$\chi^2 = 1.359$			P = .244

8.4.2.3 US subsidiaries (USSUB):

8.4.2.3.1 US subsidiaries in the Neuer Market:

As shown in Table 8.18, a large percentage of US GAAP companies have subsidiaries in the USA, whereas a nearly equal percentage of IAS companies do not have subsidiaries in the USA. This large proportional difference is an indication that companies that have at least one subsidiary in the US are more likely to be using USGAAP than others. The significance of the relationship is confirmed by a significant chi-square statistic at .001.

Table 8.18: Having a US subsidiary and choice between IAS and US GAAP in the Neuer Markt

Group / USSUB	YES	NO	High
IAS	53	81	134
	39.6 %	60.4 %	100.0 %
US GAAP	68	42	110
	61.8 %	38.2 %	100.0 %
Total	121	123	244
	46.6 %	50.4 %	100.0 %
$\chi^2 = 11.981$			P = .001

Variables as defined below Table 8.5

8.4.2.3.2 US subsidiaries in the Main Market (IRAS subsample):

As in the Neuer Markt, the percentage of the USGAAP companies that have subsidiaries in the US is high.

In Table 8.19, although the differences between the proportions of USGAAP and IAS firms in each of YES and NO categories are quite large, the chi-square is not significant. This may be explained by the fact that both IAS and USGAAP groups have very similar distribution patterns; nevertheless proportion sizes are different.

Table 8.19: Having a US subsidiary and choice between IAS and US GAAP in Main Market

Group / USSUB	YES	NO	High
IAS	44	23	67
	65.7 %	34.3 %	100.0 %
US GAAP	18	5	23
	78.3 %	21.7 %	100.0 %
Total	62	28	90
	68.9 %	31.1 %	100.0 %
$\chi^2 = 1.266$			P = .260

Variables as defined below Table 8.5

8.4.2.4 US listing (USLIST):

8.4.2.4.1 US listing in the Neuer Markt:

Only 6 companies in the Neuer Markt are listed in the US of which 5 are listed on NASDAQ (see Chapter 6 for more details). All these six companies use USGAAP (see Chapter 6 for a list with these companies). This observation support the hypothesis that companies listed in the US are likely to use USGAAP, nevertheless it was not statistically tested because of the relatively small number of observations. Furthermore, removing these companies from the sample does not change the results.

8.4.2.4.2 US Listing in the Main Market (IRAS subsample):

In the Main Market, however, the number of German companies listed in the US is 15 (Appendix 10.4), all of which are listed on the NYSE. Yet, the number of these companies included in this research is 11(details in Chapter 6). Furthermore, only 8 of these 11 companies use IRAS. Table 8.20 below shows that within the companies listed on NYSE, the proportion of companies using USGAAP is substantially larger than that of those using IAS. The chi-square statistic is significant at .003 (.01), indicating that the relationship between listing on the US and the choice of GAAP is significant.

Table 8.20: Being listed in the US ands choice between IAS and US GAAP in Main Market

Group / USLIST	**YES**	**NO**	**High**
IAS	2	65	67
	3.0 %	97.0 %	100.0 %
US GAAP	6	17	23
	26.1 %	73.9 %	100.0 %
Total	8	82	90
	8.9 %	91.1 %	100.0 %
$\chi^2 = 8.611$ (with Yates' correction)			P = .003

8.4.2.5 US Investors (USINVES):

8.4.2.5.1 US investors in the Neuer Markt:

As shown in Table 8.21, a small number of companies in the Neuer Markt have significant US investors. The USGAAP companies comprise the majority of these companies. Furthermore, although the differences between the proportions of IAS and USGAAP companies in Table 8.21 do not seem to be important, the chi-square statistic is significant at 0.01.

Table 8.21: Having US investors and choice between IAS and US GAAP in Neuer Markt

Group/ USINVES	**YES**	**NO**	**Total**
IAS	3	131	134
	2.2 %	97.8 %	100.0 %
USGAAP	13	97	110
	11.8 %	88.2 %	100.0 %
Total	16	228	244
	6.6 %	93.4 %	100.0 %
$\chi^2 = 9.071$			P= .003

Variables as defined below Table 8.5

8.4.2.5.2 US investors in the Main Market (IRAS subsample):

Table 8.22 shows that none of the US GAAP companies have US investors, whereas only four IAS companies do. This means that there is no relationship between having US investors and the choice of IAS or USGAAP in the companies listed on the Main Market.

Table 8.22: Having US investors and choice between IAS and US GAAP in Main Market

USINVES Group	YES	NO	Total
IAS	4	63	67
	6.0 %	94.0 %	100.0 %
USGAAP	0	23	23
	0.0 %	100.0 %	100.0 %
Total	4	86	90
	4.4 %	95.6 %	100.0 %
$\chi^2 = 1.437$	X^2 with continuity correction =0.375[357]		P= .569

8.4.2.6 US Managers (USMAN):

8.4.2.6.1 US managers in the Neuer Markt:

From Table 8.23, one can see that the proportion of USGAAP companies that have US managers on the supervisory board or the management board is larger than for IAS companies. This implies that companies using US GAAP tend to have supervisory board or management board members from the US more than companies using IAS.

The relationship observed above is statistically significant at .001 as indicated by the chi-square test.

Table 8.23: Having US managers and choice between IAS and US GAAP in Neuer Markt

Group/ USMAN	YES	NO	Total
IAS	6	128	134
	4.5 %	95.5 %	100.0%
US GAAP	21	89	110
	19.1 %	80.9 %	100.0%
Total	27	217	244
	11.1 %	88.9 %	100.0%
$\chi^2 = 13.310$			P = .000

Variables as defined below Table 8.5

8.4.2.6.2 US managers in the Main Market (IRAS subsample):

The proportional distribution in Table 8.24 is similar to that in Table 8.23 of the Neuer Markt. However, the differences are smaller. Therefore, the relationship is insignificant for the Main Market.

[357] Chi-square is this case cannot be used without continuity correction because of the zero cell.

Table 8.24: Having US managers and choice between IAS and US GAAP n Main Market

Group/ USMAN	YES	NO	Total
IAS	8	59	67
	11.9 %	88.1 %	100.0 %
US GAAP	5	18	23
	21.7 %	78.3 %	100.0 %
Total	13	77	244
	14.4 %	85.6 %	100.0%
χ^2 =0.656			P = .418

Variables as defined below Table 8.5

8.4.2.7 Quality Segments (SEGMENT):

This variable is tested in Chapter 7 as a determinant for the choice between GGAAP and IRAS. In this section, chi-square will test for the relationship between this variable and the choice between IAS and USGAAP. However, this will be only for the subsample of the Main Market, because it is not applicable for the Neuer Markt which comprises only one segment.

Table 8.25 below shows that the distribution of IAS companies across the two categories (YES and NO) is nearly identical to that of USGAAP companies. As a result of this the chi-square statistic is very small and highly insignificant.

Table 8.25: Being in a quality SEGMENT and choice between IAS and US GAAP in Main Market

Group/ classified	YES	NO	Total
IAS	54	13	67
	80.6 %	19.4 %	100.0 %
US GAAP	19	4	23
	82.6 %	17.4 %	100.0 %
Total	73	17	244
	81.1 %	18.9 %	
χ^2 = .045	χ^2 with continuity correction = 0.000		P = .832 (1.000)

8.4.2.8 Industry:

Binary analysis for the relationship between the industry type and the choice of GAAP can be achieved by using either a binary variable for each sector or a nominal variable which comprises a group of sectors. As shown earlier in Chapter 6, two nominal variables suggested for representing industries are INDUS1 and INDUS2. The distribution of IAS and US GAAP companies over the categories (sectors) of each these two variables is shown below:

8.4.2.8.1 Industry in the Neuer Markt:

According to Table 8.26, differences between the proportions of IAS companies and USGAAP companies within each of the sectors do not seem to be important. In the Media group, however, the difference is considerable (more than 10 percentage points). The difference in the Media category suggests that companies in this sector are more likely to be using IRAS.

The chi-square test, on the other hand, indicates that the relationship between the choice of GAAP and the sector to which a company belongs is only marginally significant.

Table 8.26: Industry sectors and choice between IAS and US GAAP in Neuer Markt

INDUS1 Group	PHARMA	SOFTWARE	TECHNO	MEDIA	TELECM	OTHER[358]	Total
IAS	9	58	31	22	5	9	134
	6.7 %	43.3 %	23.1 %	16.4 %	3.7 %	6.7 %	100%
US GAAP	15	49	23	7	7	9	110
	13.6 %	44.5 %	20.9 %	6.4 %	6.4 %	8.2 %	100%
Total	24	107	54	29	12	18	244
	9.8 %	43.9 %	22.1 %	11.9 %	4.9 %	7.4 %	100%
χ^2 =9.263							P= .099

Variables as defined below Table 8.5

The second categorical variable INDUS2 includes four main categories. As a result of this reclassification (Table 8.27), difference between the percentages of IAS and US GAAP companies within the group "Other" become substantial. The chi-square test indicates that the relationship between INDUS2 and the choice of IAS or USGAAP is significant at .05.

Table 8.27: Industry sectors (INDUS2) and choice between IAS and US GAAP in Neuer Markt

USMAN Group	SOFTWARE	TECHNO	MEDIA	OTHER2[359]	Total
IAS	58	31	22	23	134
	43.3 %	23.1 %	16.4 %	17.2 %	100 %
US GAAP	49	23	7	31	110
	44.5 %	20.9 %	6.4 %	28.2 %	100 %
Total	107	54	29	54	244
	43.9 %	22.1 %	11.9 %	22.1 %	100.0 %
χ^2 =8.609					P= .035

Variables as defined below Table 8.5

[358] includes groups which have very small frequencies (see Chapter 6)

[359] It includes sectors with very small frequencies alongside with PHARMA and TELECOM (the next two largest sectors after SOFTWARE, TECHNO and MEDIA.

8.4.2.8.2 Testing Neuer Market industry sectors as binary variables:

As explained above, one can study the relationship between each of sectors (represented by a binary variable) and the choice of GAAP. Table 8.28 presents the results of the chi-square test[360]. From this table, it can be seen the relationship between choosing IAS or USGAAP is significantly related with being either in MEDIA and OTHER2. It is also marginally significant with being in the PHARMA sector. Whereas the Media companies seem to be statistically less likely to adopt US GAAP than all other companies, the companies in the OTHER2 category are statistically more likely to adopt US GAAP than other companies.

Table 8.28: Chi-square results for industry binary variables in Neuer Markt

Variable	Chi-statistic	P value
PHARMA	3.262	.071
SOFTWARE	0.039	.843
TECHNO	0.174	.677
TELECOM	0.895	.344
MEDIA	5.831	**.016**
OTHER1	0.190	.663
OTHER2[361]	4.255	**.039**

Bold typeface indicates a statistically significant result at the 0.05 level.

8.4.2.8.3 Industry in the Main Market (IRAS companies):

The researcher has chosen not to present the crosstabulations between industry variables and the choice of IAS or USGAAP in the Main Market because they do not show any important differences. However, chi-square statistics produced on the bases of these tables are presented in Table 8.29 below. None of these statistics is significant at 0.05; nonetheless for two variables (TECHNO and SERVICE) the results were marginally significant.

Table 8.29: Chi-square for industry binary variables in Main Market

Variable	Chi-statistic	P value
UANDT	0.058	.809
MANUF1	0.118	.739
PANDC	0.012	.914
TECHNO	2.993	.084
SERVICE	2.820	.093

Variables as defined below Table 7.4

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[360] Presentation of contingency tables does not seem to be necessary, therefore they were omitted from this part.

[361] Defined in Footnote 354

8.5 Student t-test for independent samples:

As explained in Chapter 6, the t-test is run for all the variables across the two groups, IRAS and G GAAP (two independent samples) regardless of the violation of the related assumptions[362].

8.5.1 t-test for the Neuer Markt:

In Table 8.30, it can be seen that the mean of the employee numbers in the USGAAP companies is larger than that in the IAS group. The mean of total assets and turnover in IAS companies, on the other hand, is larger than that in USGAAP companies. However, the confidence intervals of the mean difference across these three variables indicate that one cannot be sure of the sign of the differences.

Unlike in the Main Market, the different size variables in the Neuer Markt companies are not consistent with each other. Employee numbers show a different pattern from total assets and turnover. The correlation matrix presented in Table shows that its correlation with the two other measures of size is not as strong as it is between the other two measures. This can be partially explained by differences in capital intensity across the different industries which seem to be clear in the Neuer Markt. For example, 62 % of the Media companies classified as "Large" in terms of assets are classified as "Small" in terms of employee numbers. This is, in turn, reflected in a weak correlation between these two size variables in the Media sector (Pearson's coefficient = 0.162). A similar observation is true for the Technology sector.

The confidence interval of profitability variables, on the other hand, indicates that one can be 95% confident that IAS companies are more profitable than US GAAP. The proportions of equity held by managers on the supervisory board or the management board (MAN2, MAN3[363]) are also higher in IAS companies than in the ones using USGAAP, with confidence intervals supporting the direction of this difference. Although, Leverage in the companies using IAS seems to be significantly higher than that of the USGAAP companies, its confidence interval supports this result only when the variable is transformed into its natural log. Implications of these results for the hypotheses of this study are discussed later in Section 7.

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[362] Although the main assumptions are the normality and the equality of variances, it is agreed that t-test is robust to the normality assumption (see Bryman and Cramer, 2001).

[363] Including family ownership

Table 8.30: Results of t-test in the Neuer Markt

Variable	Mean diff	Equal variance assumed[364]		E Not assumed		Variances test[365]	95% confidence interval of the mean difference	
	IAS – USGAAP	t value	1-tailed P	t value	P value			
EMPNO (-)[366]	-81.24	-0.869	.193	-0.853	.198	Equal	-265.436	102.952
TOASSET (-)	85.10	0.926	.178	1.019	.155	Equal	-95.844	266.037
TURNOV (-)	48.39	1.593	.056	1.722	**.044**	Not equal	-7.084	103.854
LEVER (+)	0.0479	1.864	**.032**	1.845	**.033**	Equal	-0.003	0.099
PROFIT1 (-)	0.1107	2.255	**.013**	2.187	**.015**	Not equal	**0.011**	**0.211**
PROFIT2 (-)	0.3752	2.223	**.014**	2.105	**.019**	Not equal	**0.023**	**0.727**
FRFLOAT (-)	-0.0064	-0.277	.391	-0.271	.394	Equal	-0.052	0.039
MAN1 (+)	0.0244	0.846	.199	0.848	.199	Equal	-0.033	0.081
MAN2 (+)	0.0623	2.151	**.016**	2.153	**.016**	Equal	**0.005**	**0.119**
MAN3 (+)	0.0625	2.138	**.017**	2.137	**.017**	Equal	**0.005**	**0.120**
Transformed in logarithmic form								
LNEMPNO	-0.1094	-0.790	.215	-0.784	.217	Equal	-0.382	0.163
LNASSETS	0.1068	0.790	.215	0.791	.215	Equal	-0.160	0.373
LNTURNOV	0.2681	1.572	.059	1.581	.058	Equal	-0.068	0.604
LNFRFLOAT	0.0351	0.616	.270	0.591	.278	Equal	-0.077	0.148
LNLEVER	0.2598	2.042	**.008**	2.383	**.009**	Equal	**0.048**	**0.471**
LNMAN1	0.6769	0.898	.185	0.890	.187	Equal	**0.390**	**3.008**
LNMAN2	1.6157	2.350	**.010**	2.290	**.012**	Not equal	**0.225**	**3.007**
LNMAN3	1.6990	2.558	.055	2.481	**.007**	Not equal	-0.822	2.175

Note: **bold** typeface indicates a statistically significant result at the 0.05 level. Embolden intervals, however, indicate that the difference can take only one sign (

[364] Explained in the previous part about the Main Market
[365] Results of Levene's test for the equality of variances
[366] expected signs of the differences are in parentheses.

8.5.2 t-test in the Main Market (IRAS subsample):

From Table 8.31, it is seen that if the assumption about the equality of variance is considered, a significant difference is found in one variable only (FREFLOAT). This result shows that USGAAP companies have higher free float than IAS companies.

Yet, if the assumption about the equality of variance is ignored, the difference in turnover and profitability (PROFIT2) are reported significant at .05. Furthermore, disregarding the assumption of the equality of variance, difference in employee numbers and total assets and profitability (PROFIT1) are marginally significant.

In fact in the case of the Main Market, results with the violation of the equality of variance assumption cannot be considered because of the large difference in the sample size of the two groups (IAS and USGAAP)[367].

The confidence intervals shown in Table 8.31 show that the only the difference that on can be confident about is that in the free float which shows that US GAAP companies have higher free float.

[367] As explained earlier the t-test can be robust to the violation of this assumption. However, this assumption cannot be disregarded if the two samples differ substantially in size

Table 8.31: Results of t-test in the Main Market (IAS and US GAAP)

Variable	Mean difference IAS – USGAAP	Equal variance assumed		Equality not assumed		Variances test[368]	95% confidence interval of the mean difference	
		t value	1-tailed P	t value	P value			
EMPNO	-32710	-1.590	.058	-1.187	.123	Not Equal	-12901	7979
TOASSET	-12169	-1.527	.065	-1.144	.131	Not Equal	-1795	1942
TURNOV	-10503	-1.896	**.031**	-1.313	.101	Not equal	-2762	1981
LEVER	0.008	0.175	.431	0.213	.416	Equal	-0.084	0.100
PROFIT1	0.062	1.634	.053	1.158	.129	Not equal	-0.037	0.024
PROFIT2	0.552	1.797	**.036**	1.021	.159	Not equal	-0.037	0.022
FREFLOAT	-0.157	-2.456	**.008**	-2.184	**.018**	Not Equal	**-0.284**	**-0.03**
Transformed in logarithmic form								
LNEMPNO	-0.613	-1.022	.155	-0.983	0.166	Equal	-1.803	0.578
LNASSETS	-0.913	-1.548	.063	-1.561	0.064	Equal	-2.084	0.259
LNTURNOV	-0.882	-1.434	.078	-1.428	0.081	Equal	-2.103	0.340
LNPROF1	0.001	1.640	.052	1.160	0.129	Not equal	-0.001	0.027
LNPROF2	0.013	1.794	**.036**	1.019	0.160	Not equal	-0.0003	0.003

Note: **bold** typeface indicates a statistically significant result at the 0.05 level.

[368] Results of Levene's test for the equality of variances

8.6 Mann-Whitney test:

As previously explained Mann-Whitney is the non-parametric equivalent of the t-test. As indicated in Table 8.1 above, none of the variables in the Neuer Markt is normally distributed. Therefore, this test may theoretically be the right choice to analyse the Neuer Markt data. Results shown in Table 8.32 below are consistent with those of the parametric equivalent t-test.

In the Main Markt IRAS subsample, LEVER and FREFLOAT are not tested using Mann-Whitney because they are normally distributed. None of the results in this part was significant.

Table 8.32: Results of Mann-Whitney in the Neuer Markt and the Main Market

Neuer Markt			**Main Market subsample**		
Variable	Z value	1-tailed Sig	Variable	Z Value	1-tailed Sig
EMPNO	-0.878	.190	EMPNO	-0.985	.162
TOASSET	-0.284	.388	TOASSET	-1.383	.084
TURNOV	-1.563	.059	TURNOV	-1.216	.112
LEVER	-2.262	**.012**	PROFIT1	-0.042	.484
PROFIT1	-1.229	.110	PROFIT2[369]	-0.143	.444
PROFIT2[370]	-1.553	.060	X[371]	X	X
FREFLOAT	-0.335	.369	X	X	X
MAN1	-0.832	.203	X	X	X
MAN2	-2.166	**.015**	X	X	X
MAN3	-2.180	**.015**	X	X	X

Note: **bold** typeface indicates a statistically significant result at the 0.05 level.

Variables as defined below Table 8.5

[369] It becomes insignificant after excluding outliers, although this procedure does not alter the results of the other variables significantly.

[370] It becomes insignificant after excluding outliers, although this procedure does not alter the results of the other variables significantly.

[371] These variables in the Main Market are not tested using Mann-Whitney, because while LEVER and FREFLOAT are normally distributed, management ownership variables are binary variables.

8.7 Multivariable Analysis for the Neuer Markt data:

As in Chapter 7, the results of the multivariable analysis are depicted using both a full model and a reduced model (constructed). However, before studying these results, it may be useful to present the results of univariable models. Results for these three levels of analysis are presented and explained below:

Table 8.33: Results of the univariable models in the Neuer Markt

	B	S.E.	Wald	G [372]	Sig [373].	Exp(B)	95.0% C.I.	
SEMPNO	0.016	0.018	0.736	0.758	.196	1.016	0.980	1.052
SASSETS	-0.033	0.051	0.408	1.169	.262	0.968	0.876	1.070
STURNOV	-0.134	0.096	1.973	3.170	.080	0.874	0.725	1.055
LEVERAGE	-1.215	0.658	3.415	3.487	**.033**	0.297	0.082	1.076
PROFIT1	-0.769	0.351	4.791	5.062	**.015**	0.463	0.233	0.923
PROFIT2	-0.256	0.125	4.218	5.282	**.020**	0.774	0.607	0.988
FREFLOAT	0.200	0.718	0.077	0.077	.371	1.221	0.299	4.986
MAN1	-0.490	0.579	0.718	0.724	.199	0.612	0.197	1.904
MAN2	-1.233	0.580	4.526	4.613	**.017**	0.291	0.094	0.908
MAN3	-1.214	0.574	4.473	4.555	**.017**	0.297	0.096	0.915
USSUB	0.906	0.264	11.770	12.082	**.001**	2.474	1.475	4.151
AUDITOR	1.104	0.268	16.933	17.633	**.000**	3.015	1.782	5.101
USINVS2	1.767	0.654	7.290	9.463	**.004**	5.852	1.623	21.100
USMANG	1.616	0.483	11.194	13.509	**.001**	5.034	1.953	12.973
INDUS2			7.662		**.054**			
PHARMA	1.656	0.605	7.490		**.006**	5.238	1.600	17.147
SOFTWARE	0.977	0.475	4.220		**.040**	2.655	1.046	6.741
OTHER	1.002	0.486	4.251		**.039**	2.724	1.051	7.061

Note: **bold** typeface indicates a statistically significant result at the 0.05 level. The dependent variable is given 0 for GGAAP and 1 for IRAS.
Variables as defined below Table 8.5

[372] This Chi-square for the model with variable included whose significance level is not very different from the significance of Wald statistic in this case; nevertheless it is lower for the first.
[373] Except for the significance of industry variables, the significance of all other variables is 1-tailed. This does not make any difference for most of the variables except for LEVER and PROFIT2, which would be marginally significant if the two-tailed significance is considered.

Table 8.34: Results of the Full Multivariable (including all variables)

	B	S.E.	Wald	Sig.	Exp (B)	95% C.I. for Exp(B)	
LEVER	-1.879	0.850	4.894	**0.027**	0.153	0.029	0.807
PROFIT1	-1.316	0.442	8.864	**0.003**	0.268	0.113	0.638
EMPNO	0.024	0.022	1.128	0.288	1.024	0.980	1.070
MAN1	0.688	0.724	0.903	0.342	1.990	0.482	8.221
FREFLOAT	0.370	0.879	0.177	0.674	1.448	0.259	8.106
AUDITOR	0.966	0.304	10.084	**0.001**	2.627	1.447	4.769
US_MAN	0.812	0.631	1.656	0.198	2.253	0.654	7.762
USSUB	0.645	0.307	4.410	**0.036**	1.906	1.044	3.479
USINVS	1.264	0.806	2.461	0.117	3.540	0.730	17.177
INDUS3			6.531	0.088			
PHARMA	1.351	0.699	3.737	**0.053**	3.861	0.981	15.192
SOFTWARE	0.815	0.554	2.166	0.141	2.259	0.763	6.686
OTHER	1.332	0.570	5.465	**0.019**	3.788	1.240	11.572
Constant	-2.298	0.780	8.680	0.003	0.100		
Model Chi-square =57.183 (Sig: .000)							

Note: **bold** typeface indicates a statistically significant result at the 0.05 level. The dependent variable is given 0 for GGAAP and 1 for IRAS.
Variables as defined below Table 8.5

Whereas Table 8.33 shows the results of univariable regression analysis (a model for each variable); Table 8.34 shows a full model which includes all the variables. However, in order to avoid high multicollinearity, a single variable is included to proxy for each of size, profitability and management ownership. Other full models which include the alternative proxies for size (total assets and turnover), profitability (PROFIT2) and management ownership (MAN2 and MAN3) are depicted in Appendix 10.7. As can be seen from the results in Table 8.33, 10 variables were significant in the univariable models, but only 5 of these variables were significant in the full model shown in 8.34. The confidence interval of all the significant variables either does not contain the value 1 or barely does (the case of PHARMA). As explained in Chapter 7, this indicates the stability of the results for most of the variables, which in turn means that we can be more confident about the estimated coefficients. Furthermore, confidence intervals which clearly include the value 1 can be an indication of overfitting in this model and the need to a model with a smaller number of variables.

A reduced model similar to that constructed for the Main Market in Chapter 7 is constructed here for the Neuer Markt using 'backward elimination' as depicted in Appendix 10.7 (this approach is explained in Chapter 7). As can be seen in Table 8.35, results of this model show that USINVES (US investors) is significant at .05,

although it was not in the full model. Still, one should remember that this model gives us a better combination of variables in terms of the likelihood ratio and avoid the risk of overfitting.

Table 8.35: Results of the multivariable model in the Neuer Markt

	B	S.E.	Wald	Sig.	Exp(B)	95.0% C.I. for EXP(B)	
LEVER (-)	-1.525	0.774	3.884	0.049	0.218	0.048	0.992
PROFIT1 (+)	-1.178	0.419	7.917	0.005	0.308	0.136	0.700
USSUB (+)	0.774	0.296	6.833	0.009	2.168	1.214	3.873
AUDID (+)	0.984	0.296	11.071	0.001	2.674	1.498	4.773
USINVS (+)	1.696	0.689	6.068	0.014	5.454	1.414	21.031
INDUS			6.795	0.079			
PHARMA	1.335	0.682	3.833	0.050	3.800	0.998	14.466
SOFTWARE	0.844	0.534	2.493	0.114	2.325	0.816	6.627
OTHER	1.309	0.539	5.896	0.015	3.704	1.287	10.658
MEDIA[374]	0.000				1.000		
Constant	-1.954	0.596	10.749	0.001	0.142		
Model Chi-square: 50.564 (Sig: .000)							

Note: **bold** typeface indicates a statistically significant result at the 0.05 level. The dependent variable is given 0 for GGAAP and 1 for IRAS.
Variables as defined below Table 8.5

Using the information presented in Table 8.35, the multivariable logistic model can be written in the following form:

$$\log\left(\frac{P(USGAAP)}{P(IAS)}\right) = -1.525LEVER - 1.178PROFIT1 + 0.774USSUB + 0.984AUDID$$
$$+1.696USINVES + 1.335PHARMA + 0.844SOFTWARE + 1.309OTHER$$

As explained earlier, there is more than one alternative for measuring profitability and management ownership. Therefore, only one alternative is included in the model.

8.7.1 Model interpretation:

For easier interpretation, this section interprets the exponentiated coefficients (Exp (B)) rather than the coefficients themselves.

For all the variables in the model in Table 8.35, the confidence intervals either do not contain 1 or just barely do (in the case of PHARMA and SOFTWARE). As mentioned above, this observation means that that we can be very confident about the stability of the results and the effect of the variables.

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[374] MEDIA is chosen as a reference category. Still the overall significance of INDUS is the same using a different category as reference. MEDIA is chosen because it is the only category compared to which all categories are significant.

The model adopted above shows that a leverage (profitability) increase of one unit (0.01) decreases the ratio of the probability of being a USGAAP company to the probability of being a IAS company by a factor of 0.218 (0.308) (Exp (B)). Still, the sign of the profitability coefficient is opposite to the expected one (discussed later at the end of this chapter).

Having a subsidiary in the US, on the other hand, increases the likelihood of compliance with USGAAP. This is reflected in an increase in the ratio of the probability of being a USGAAP company to that of being an IAS company by a factor of 2.168. The same observation applies to having US investors and a Big-5 auditor.

The overall significance of the industry variable INDUS2 indicates that it is significant at 0.1. However, the categories PHARMA and OTHER are significant at higher levels (0.05). The results for the category PHARMA (which can be replaced by a binary variable[375]) indicate that being in the pharmaceuticals sector rather than the media sector (the reference category) increases the ratio of the probability of being a USGAAP company to the probability of being an IAS company by 3.8. A similar observation applies to the results of SOFTWARE and OTHER. On the other hand, having the category OTHER as a reference category shows that being in the MEDIA sector is a significant factor which decreases the likelihood of being a USGAAP company.

Further discussion of these results is presented at the end of this chapter.

8.7.2 Model Evaluation:

The following are results the most important tests of goodness of fit which are discussed in previous sections.

8.7.3 Model chi-square:

The model chi-square statistic for this model as shown at the bottom of Table 8.35 is significant at less than 0.000. This result indicates that predictors in this model perform significantly as group. (Model chi-square of the full model is 57.183 and of higher significance)

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[375] This will give an identical result.

8.7.4 Hosmer and Lemeshow test:

This test resulted in chi-square statistic of 5.958 which highly insignificant (0.652). This level of insignificance indicates a good fit which better than that of the Main market (higher P value). (This statistic for the full model is 1.928 and insignificant at 0.986 which indicates a very high fit).

8.7.5 McFadden R_L^2:

The statistic for the model above was 0.15 which indicates a moderate amount of explained variation.

8.7.6 Accuracy of prediction:

Although the overall percentage of correct classification is less than that in the previous model constructed for the Main Market. this model seems to be better in predicting the event (compliance with USGAAP). Furthermore, the model performs better than chance by a larger margin than that of the Main Market model[376].

Indices of the predictive efficiency show the following:

- $\lambda_p = 0.345$ ($d = 4.9$ with statistical significance $p = 0.000$)
- $\tau_p = 0.404$ ($d = 6.251$ with statistical significance $p = 0.000$)

Both results indicate that, in terms of prediction. the model built for the Neuer Markt performs better than that built for the Main market.

Table 8.36: Classification table of the adopted model in the Neuer Markt

	Predicted		% correct
Observed	IAS	USGAAP	
IAS	103	31	76.9
USGAAP	41	69	62.7
Overall percentage			70.5

8.7.7 Testing for linearity:

The model shown above contains two continuous variables which are LEVER and PROFIT1. To check whether the logit was linear in either of these variables. Box-Tidwell was used as well as Polynomial regression strategies. The results of these tests indicate that both variables are linear in the logit.

[376] The best result can be achieved by chance as shown by SPSS' output is to get all the IAS firms classified correctly giving an over all percentage of 54.9 %. Hence this model improves the prediction by 15.5 % (9.1 % in the Main market).

8.7.8 *Testing for multicollinearity:*

On the basis of the most conservative criteria (maximum VIF of 4 and minimum tolerance value of 0.1), Table 8.37 shows that there is no multicollinearity between the model's variables.

Table 8.37: Multicollinearity diagnostics 1

	ToleranceV	VIF
PROFIT1	.903	1.108
LEVER	.885	1.130
USINVES	.979	1.021
AUDID	.930	1.075
USSUB	.921	1.085
PHARMA	.561	1.781
SOFTWARE	.355	2.818
OTHER	.384	2.606

Variables as defined below Table 8.5

Furthermore, Table 7.38 shows both the Eigenvalues and the condition index values which are also used diagnose multicollinearity. A conditions index less than 15 confirms the observation stated above that there is no multicollinearity (a discussion about multi-collinearity is in Chapter 7).

Table 8.38: Multicollinearity diagnostics 2

Dimension[377]	Eigenvalue	Condition index
1	4.175	1.000
2	1.170	1.889
3	1.039	2.005
4	.951	2.095
5	.627	2.582
6	.388	3.281
7	.367	3.372
8	.237	4.199
9	.044	9.634

8.7.9 *Residuals Diagnostics:*

To find the firms (cases) for which the model fits poorly, three types of residual were examined: Studentized residual, standard residual and deviance statistics.

[377] There is 1 dimension for each parameter.

Table 8.39: Residual diagnostics

Residual	**± 2.0**		**± 2.5**		**± 3.0**	
Standardized (zre)	7	2.9 %	5	2.0 %	2	0.1 %
Studentized (sre)	5	2.0 %	0		0	
Deviance (dev)	5	2.0 %	0		0	

It can be seen from Table 8.39 that less than 3 % of all types of residuals outside the range ± 2. Furthermore, only 2 % of the standardized residuals are outside the range ± 2.5 with only two values greater than 3. These frequencies are consistent with what we should expect about the distribution of the standardized residuals. It is explained earlier in this chapter that we would expect about 5 % of the sample to have standardized residuals outside the ± 2 bounds and 1 % outside the ± 2.5 bounds. Overall this indicates that apart from these few cases the model is a good fit.

However, data for these firms was checked to detect any unusual observations[378]. Figure 8.2 below shows a histogram with the standardized residuals with a normal curve. This histogram shows the few observations outside the boundaries of ± 2. The type of histogram we have here is very common in logistic regression and should not be of concern (SPSS Inc, 2001).

[378] Three of these firms complied with USGAAP despite the fact that they were in the Media sector and did not have either a subsidiary in the US or US investors. They also had non-Big5 auditors and had high leverage. According to the results shown for the model above, these firms are more likely to be IAS firms. Although the model indicates that MEDIA firms are less likely to comply with USGAAP, examples from reality show that Media firms tend to use particular standards in USGAAP to deal with specific accounting issues in the Media. Nothing was unusual in the data for the other two firms.

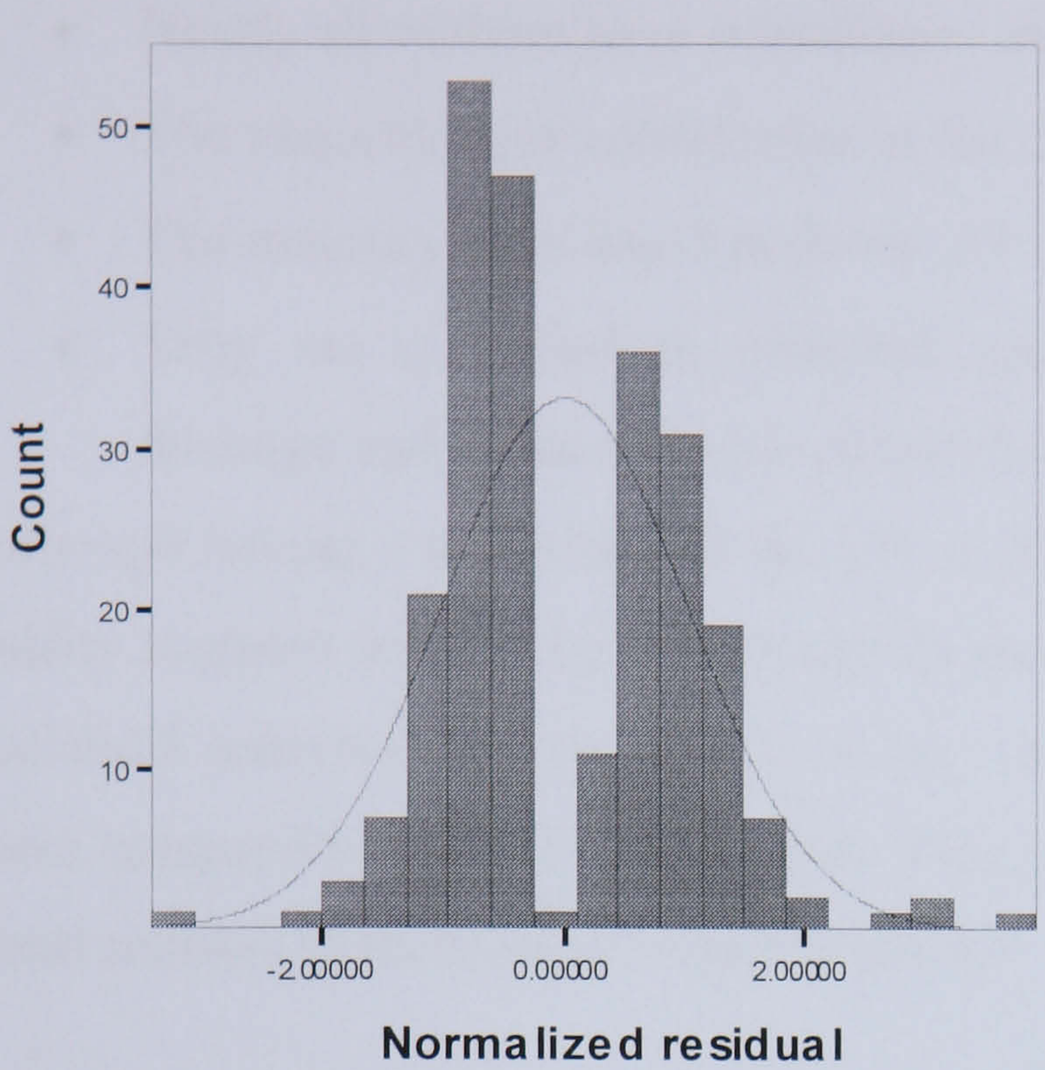

Figure 8.2: Distribution of the standardized residuals

The second aim of diagnostics is to detect any cases (firms) which may have undue influence on the model. Examining DFBeta values showed that none of these values was greater than 1 (the maximum DFBeta value was 0.259, which is far from 1[379]).

8.8 Multivariable analysis for the subsample of the Main Market:

There is not a multivariable model for the choice between IAS and USGAAP in the Main Market. The reason for this is that USLIST is the only one factor that proved to be significant in a multivariable setting. This result is consistent with that produced by the multinomial model presented in Chapter 7.

Although USLIST is a good predictor, it explains only small proportion of the compliance with USGAAP. In other words, only six companies from the 23 using USGAAP are listed in the US. Therefore, Table 8.40 is designed to show some important facts about these firms. Although the vast majority of this information can be obtained from the crosstabulations presented above, Table 8.40 presents this information in a different way that gives a better and more complete overview.

The following facts on USGAAP companies in the Main Market can be extracted from Table 8.40:

- They do not tend to be in particular industry sectors,

[379] Chapter 7 explains that DFBeta greater than 1 causes concern.

- They are almost classified in quality segments (only 3 which are not).
- Nearly all of them have subsidiaries abroad (except one).
- The majority have subsidiaries in the US (18 out of 23, 78%).
- The majority have Big-5 auditors (19 out of 23, 82.6 %).
- They are classified in different size categories, and different levels of leverage and different levels of free float.

Although having a subsidiary in the US, a Big-5 auditor and being a classified in a quality segment seem to be significant characteristics of companies using USGAAP, statistical analysis did not prove that they are significant factors in differentiating these companies from those using IAS. This may be related to the fact that there is a small number of companies using US GAAP.

Table 8.40: A summary with the main features of US GAAP companies

Company	Sector	Segment	USLIST	FORSUB	USSUB	Big-5	MAN3	Leverage	F. FLOAT	Size
DAIMLERCHRYSLER	Automobile	DAX	YES	YES	YES	YES	NO	Medium	High	Small
E.ON AG	Utilities	DAX	YES	YES	YES	YES	NO	Low	High	Medium
EPCOS AG	Telecommunication	DAX	YES	YES	YES	YES	NO	Low	High	Large
SAP AG	Software	DAX	YES	YES	YES	YES	YES	Low	High	Large
SIEMENS AG	Telecommunication	DAX	YES	YES	YES	YES	YES	Medium	High	Medium
THYSSENKRUPP AG	Basic Resources	DAX	NO	YES	YES	YES	NO	Medium	High	Medium
Cargolifter AG	Transportation	MDAX	NO	YES	YES	YES	YES	Low	High	Small
Celanese AG	Chemicals	MDAX	YES	YES	No	YES	NO	Low	High	Small
Continental AG	Automobile	MDAX	NO	YES	YES	YES	NO	Medium	High	Small
Dürr AG	Machinery	MDAX	NO	YES	YES	YES	NO	High	Medium	Medium
Jungheinrich AG	Machinery	MDAX	NO	YES	YES	YES	YES	Medium	Low	Medium
mg technologies AG	Industry	MDAX	NO	YES	YES	YES	NO	Medium	High	Medium
Schwarz Pharma AG	Pharmaceuticals	MDAX	NO	YES	YES	YES	YES	Medium	Low	Large
Techem AG	Industry	MDAX	NO	YES	No	YES	YES	Low	High	Large
Vossloh AG	Telecommunication	MDAX	NO	YES	YES	NO	YES	Medium	High	Medium
Zapf Creation AG	Consumer	MDAX	NO	YES	YES	NO	NO	Medium	High	Large
Data Modul AG	Telecommunication	SMAX	NO	YES	YES	YES	YES	Medium	High	Large
Knorr Capital Partner	Finance	SMAX	NO	YES	YES	YES	YES	Medium	Medium	Small
Marseille-Kliniken AG	Pharmaceuticals	SMAX	NO	NO	No	YES	YES	Medium	Medium	Medium
FAG Kugelfischer G. S	Machinery	Unclassified	NO	YES	YES	NO	YES	Low	Low	Medium
VCL Medien	Media	Unclassified	NO	YES	No	NO	YES	High	Medium	Small
Debitel AG	Telecommunication	Unclassified	NO	YES	No	YES	NO	Medium	Low	Large

Table 8.41: A summary of the results of all statistical analysis on the Neuer Market

Hypotheses (alternate form)	**Chi-square**[380]	**t-test**	**Mann-Whitney**	**Univariable models**	**Multivariable models**	**Comments**
$H11_0$: Adoption of USGAAP is either not associated with listing on US Exchanges or negatively related with it.	X	X	X	X	X	It is not tested for the Neuer Market because very few companies are listed on the US.
$H12_0$: Adoption of USGAAP is either not associated with having subsidiaries in the US or negatively related with it.	H_0 : rejected H_1 : accepted[381]	n/a[382]	n/a	H_0 : rejected H_1 : accepted[383]	H_0 : rejected H_1 : accepted	
$H13_0$: Adoption of USGAAP is either not associated with having investors from the US or negatively related with that.	H_0 : rejected H_1 : accepted	n/a	n/a	H_0 : rejected H_1 : accepted	H_0 : rejected H_1 : accepted	
$H14_0$: Adoption of USGAAP is either not associated with having managers from the US or negatively related with that.	H_0 : rejected H_1 : accepted	n/a	n/a	H_0 : rejected H_1 : accepted	H_0 : rejected H_1 : accepted	This variable is **insignificant** the adopted multivariable model, it is significant in other multivariable models
$H15_0$: Adoption of USGAAP is either not associated with size or negatively related	H_0 : accepted	H_0 : accepted	H_0 : accepted	H_0 : accepted	H_0 : accepted	

[380] One should remember that chi-square is used with all variables even the continuous ones (after being categorized).

[381] Accepting H_1 is based on the proportional distribution in the contingency tables presented above.

[382] Not applicable test because the variable is binary

[383] The alternative hypotheses are accepted when the sign of the coefficient is consistent with the expected one.

Hypotheses (alternate form)	Chi-square[380]	t-test	Mann-Whitney	Univariable models	Multivariable models	Comments
$H16_0$: Adoption of USGAAP is either not associated with free float or negatively related with it.	H_1: accepted	H_0: accepted	H_0: accepted	H_0: accepted	H_0: accepted	
$H17_0$: Adoption of USGAAP is either not associated with outside management ownership or negatively related with it.	H_0: accepted	H_0: rejected H_1: accepted	H_0: rejected H_1: accepted	H_0: rejected H_1: accepted	H_0: accepted	
$H17_0$: Adoption of USGAAP is either not associated with having a Big-5 auditor or negatively related with that.	H_0: rejected H_1: accepted	n/a	n/a	H_0: rejected H_1: accepted	H_0: rejected H_1: accepted	
$H18_0$: Adoption of USGAAP is either not associated with leverage or positively related with that.	H_0: rejected H_1: accepted	H_0: rejected H_1: accepted	H_0: rejected H_1: accepted	H_0: rejected H_1: accepted	H_0: rejected H_1: accepted	
$H19_0$: Adoption of USGAAP is either not associated with profitability or negatively related with that.	H_0: accepted	H_0: accepted	H_0: accepted	H_0: accepted	H_0: accepted	Explanation is given below
$H20_0$: Adoption of USGAAP is either not associated with industry to which a firm belongs	H_0: rejected H_1: accepted	n/a	n/a	H_0: rejected H_1: accepted	H_0: rejected H_1: accepted	According to the chi-square test, the only significant variable is Media (discussed below)

8.9 Summary and Discussion of the results on the choice between IAS and USGAAP in the Neuer Markt:

The results of this chapter are divided into two sections: results from the Neuer Markt and results from the Main Market; nevertheless analysis presented in this chapter, for both markets, is on the choice between IAS and US GAAP. The main hypotheses tested in this chapter are those linking companies with a US element. Still, most of the hypotheses tested in Chapter 7 are tested in this chapter as well on the grounds that US GAAP is considered to be of higher quality, more stringent and requiring more disclosures than IAS. In other words, the evaluation of US GAAP compared with IAS is similar to that of IRAS compared with GGAAP. Results on these particular hypotheses are found to be substantially different from those in Chapter 7. Yet, as it will be seen from the discussion below, this difference cannot be blamed on the assumption stated above (the superiority of US GAAP to IAS) being wrong. The results discussed in the following section are those of the Neuer Markt, as presented in table 8.41.

In general, all the variables that are have a US element, namely USINVES, USSUB and USMAN, proved to be important determinants in choosing US GAAP rather than IAS in the Neuer Markt. However, USMAN is not included in the multivariable model. In broad terms, this part of the results is consistent with that obtained by Weißenberger et al (2004), where they concluded that companies using US GAAP are those which believe that it would be advantageous with in the US market.

The variable **USMAN**, which indicates whether a firm has managers from the US (on the supervisory board or the management board) or not, is significant in the bivariable analysis (chi-square and univariable models), but omitted from the adopted multivariable model. Further analysis shows that the effect of this variable is masked by the variable USINVES (having significant investors from the US). As shown in the correlation matrix in Table 8.5, the correlation between these two variables is strong (significant Pearson coefficient of 0.556). Despite the strong relationship between USINVES and USMAN, the presence of US investors is not the reason (at least not the main reason) for the presence of US managers on the supervisory board or the management board (as expected in the hypothesis in Chapter 5). A crosstabulation between the two variables shows that while 81 % of

companies which have US investors have US managers, only 48 % of the companies with US managers have US investors. In fact, the variable which seems to explain the presence of US managers is USSUB, where 81.5 % of the companies with US managers have subsidiaries in the US. A similar observation is found in the analysis on the Main Market in Chapter 7 between FORSUB (having a foreign subsidiary) and FORMAN (having foreign managers). Therefore, FORMAN was considered then as an indication of the importance of the foreign subsidiaries and, in turn, as a proxy for internationality (further discussion of this is provided in Chapter 7). Based on this observation, it is possible to suggest that the presence of a US manager on the supervisory board or the management board is an indication of the importance of the US subsidiary. Mezias (2002) reports that European companies, including German, that have American top officers for their subsidiaries in the US face fewer lawsuits. American top officers can influence the choice of US GAAP by persuading the board of management that this will help them to avoid any probable legal disputes related to their business in the US. The fact that USMAN is not included in the adopted model should not mean that this variable is not an important predictor; nevertheless it is highly correlated with other factors which mask its effect.

Having a US subsidiary USSUB is one of the highly significant factors in the adopted model. The acceptance of the alternative hypothesis indicates the importance of having a subsidiary in the US in the choice of US GAAP. This significance can be explained by the need of these companies to be more transparent with third parties in the US which include suppliers, government and strategic customers through using a GAAP that is familiar to these parties. Furthermore, they are likely to be seeking finance for their US projects from US institutions, for hedging reasons. Finance sought by German firms operating in the US may come from American banks which are likely to require or at least to prefer financial information prepared under their local GAAP. They may also be in interested in seeking finance through a future listing on a US Exchange.

It should be mentioned that because this variable is a dichotomy (binary), it disregards the relative importance of the US subsidiary for the German firms. Further research could investigate the impact of the relative size of these subsidiaries on the choice of standards (although this information is not available in *Hoppenstedt*), as one might expect that having a small US subsidiary is less likely to influence the GAAP decision than having a large one.

One important finding is that USSUB is a highly significant factor in choosing IRAS (rather than GGAAP) in the companies of the Main Market, but not in the choice between IAS and US GAAP (further discussion is presented below in section on the Main Market). This contrasts with the finding in the Neuer Markt, where the choice is only between IAS and US GAAP.

USINVES is the second important variable in our multivariable model. The null hypothesis on US investors is rejected at all levels of statistical analysis. To understand the implication of this result, one should remember that this variable indicates whether US investors exist in the body of investors or not. This variable was initially measured on a continuous scale, but because of the large number of zeros it was changed into a binary variable. It is also important to recall that these investors are assumed to be those with a significant investment[384]. Accepting the alternative hypotheses as stated above indicates the presence of US investors in the body of investors increases the probability of using US GAAP. This implies that managers of these companies are concerned with satisfying the need of their US investors with the type of information that can be directly comparable with that obtained in the US. Companies may also be trying to attract more US investors. Furthermore, US investors who have larger proportions of a company's equity would be able to put pressure on or to persuade management to adopt US GAAP rather than IAS. This may be more probable in the Neuer Markt than in the Main Market, where GGAAP appears to be a relatively cheap (less costly) choice. CalPERS, the largest institutional investor in the US is a good example of the influence that US institutional investors can have on German companies to develop their corporate governance system and to increase their transparency (Brändle and Noll, 2004). One of the main arguments for the role of US investors in the choice of US GAAP is that it leads to high transparency, which is in turn would be appreciated by larger US institutional investors, who need such transparency for more for investment decision making purposes (see Chapter 5 for further discussion).

As mentioned earlier **listing in the US** is one of the most influential factors in the adoption of US GAAP; nevertheless the very few Neuer Markt companies listed in the US make it impossible to test this hypothesis statistically. Yet, the fact that all the

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[384] This because shares in Germany are largely bearer shares and then the ones reregistered in the annual reports or in a database like Hoppenstedt are assumed to be significant

Neuer Markt companies listed on NASDAQ use US GAAP provides some support for this linkage.

A similar case is **management ownership**. where variables MAN2 and MAN3 (the ones including family ownership) proved to be significantly different across the two groups, and to be significant predictors in the univariable models. However. they are omitted from the multivariable model. Auditor identity (AUDID) appears to be the most obvious factor causing the insignificance of these two variables in the multivariable model. The correlation matrix above (Table 8.5) shows that AUDID is significantly negatively correlated with both management variables. This may imply that companies with large proportions of management ownership tend not to have Big-5 auditors. One explanation for this is that when managers own a high percentage in the equity capital they might be reluctant to spend the high fees required to hire a Big-5 auditor. Furthermore, they probably would not need to hire a Big-5 auditor to signal to the rest of shareholders that they are acting in the best interests of the firm, as the agency costs are demonstrably low. It can also be said that shareholders would have less need to impose a Big-5 auditor as a monitoring device on the managers' behaviour.

Results of the t-test and univariable models presented above show that companies with low proportions of management ownership are more likely to be using US GAAP. The fact that these companies are also likely to have Big-5 auditors, which is a highly significant factor, may be a good explanation as to why the management variables are insignificant when included with AUDID in a multivariable model.

Unlike the choice between GGAAP and IRAS, **size** is not a significant factor in the choice between IAS and USGAAP. Although the t test proved that, in terms of turnover, IAS companies are significantly larger than USGAAP companies, the results become insignificant when extreme values are removed from the analysis. It is also against the expectations of the alternative hypothesis on size, which expects that USGAAP companies will be larger than IAS companies. Although the difference between the IAS group and USGAAP group in terms of employee numbers is insignificant, its sign is consistent with that of the alternative hypothesis. Leuz (2003) found that, in terms of market capitalisation, USGAAP companies in the Neuer Markt are significantly larger than IAS companies. However, size in Leuz's work is only a significant variable in the univariable analysis, but not in the

multivariable analysis[385]. Ashbaugh (2001). on the other hand, found that companies that are relatively larger, in terms of market capitalisation[386] are more likely to use IAS than USGAAP. Yet, it should be remembered that Ashbaugh's (ibid) sample comprised companies from different countries. Hence institutional differences may make the comparison less relevant. Furthermore, it appears that there is no large difference in size between companies in the Neuer Markt. One can easily see that the "Range" for the Neuer Markt presented in Table 7.1 is much smaller than that for the Main Market shown in Table 7.2. This may be an initial indication that the size factor in the Neuer Markt is not as important as it is in the Main Market.

Although the results on **profitability** measured by PROFIT1 and PROFIT2 are statistically significant, the null hypothesis is accepted because of the inverse nature of the relationship between profitability and using US GAAP. The results indicate that IAS companies are more profitable than US GAAP companies. According to the alternative hypothesis, profitable companies were expected to use US GAAP rather than IAS. One possible explanation for this finding is the expected relationship between profitability and internationality. The financial literature suggests that the profitability of multinational corporations (MNCs) increases with the degree of internationality (Chkir and Cosset, 2003, p511). The significantly positive correlation between profitability measures (PROFIT1, PROFIT2) and FORMAN (as a proxy for internationality[387]), is consistent with this suggestion. Given this relationship, one would expect profitable companies to be more international and more likely to comply with IAS rather than USGAAP. Although it is not self-evident that IAS is more international than US GAAP, a simple justification the argument is the fact that IAS derive from an international organization and represent an international view. US GAAP, on the other hand, belongs to one single country; nevertheless it is widely accepted internationally.

Tarca (2004) found that international firms are more likely to be using IAS rather than USGAAP (marginal significance). This, in turn, means that profitable

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[385] In the draft of his paper (Leuz (2000)), size variables (market capitalisation and employee numbers) are significant in the multivariable model as well. However, Leuz (2003) had different results in the published work.

[386] It is the market value of a firm's shares listed on its domestic exchange divided by the total capitalisation of its domestic equity market at the end of the sample year.

[387] FORMAN indicates whether a firm has a foreign manager of not. In Chapter 7, it is considered as a better proxy for internationality than FORSUB. The same relationship proved to be existing in the Neuer Markt analysis, although it is not presented above.

companies can be expected to prefer IAS to USGAAP. Previous literature does not provide any results on significant profitability differences across IAS and USGAAP groups. Furthermore, the alternative hypothesis that profitable companies are expected to comply with USGAAAP is based on same arguments used to argue that profitable companies would choose IRAS in preference to GGAAP. Previous research proves that USGAAP is more restrictive and requires more disclosure than IAS (Leuz 2003), but differences between USGAAP and IAS cannot be as large and high as they are between IRAS and GGAAP. Therefore, profitable companies can find the advantages they need in a high quality set of accounting standards in IAS without incurring the additional costs of using US GAAP.

Finally, one fact should be considered here is that profitability is a variable may not be totally independent of the accounting standards used. Although it is not evidenced in the literature, US GAAP is generally viewed to be more conservative than IAS and likely to produce lower profits

Industry variables are tested in two forms: nominal variables (including different categories) and binary variables. The hypothesis on industry is general and does not assume any specific output. In other words, it does not expect companies in a specific sector to comply with a specific set of accounting standards. Although, according to the chi-square test, not all the binary variables representing industry sectors are significant, finding that some of them are is enough to reject the null hypothesis and to accept the alternative one. The multivariable analysis, on the other hand, shows that all the industry variables can be significant factors. Interpretation of the model coefficients presented above provides more discussion on these binary variables. In general, the results indicate that companies in the sectors PHARMA, SOFTWARE and OTHER[388] are more likely to use USGAAP than the ones in MEDIA. It is mentioned above that changing the reference category provides different comparisons. As shown in Table 8.41, regrouping the industry sectors into PHARMA, SOFTWARE, MEDIA, TECHNO and OTHER[389] (as a reference category) shows that companies in each of these categories are less likely to be using USGAAP than the ones in the category OTHER. In the analysis on the choice between IAS and USGAAP across the different industry sectors, one should consider the relationship between these industry sectors and the US market. Further analysis

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[388] Other includes: Automobile, Retail, Transportation, Financial services, Utilities and Technology

[389] The only difference is having technology companies in a separate sector.

shows that there is an apparent relationship between some of these industries and having subsidiaries in the US. The majority of companies in the sectors PHARMA. TECHNO and Automobile have subsidiaries in the US (70.8%, 63% and 80% respectively). This is also reflected in a significantly positive correlation between being in each of these sectors and USSUB (Table 8.5).

This correlation can be related to the importance of the US market for these particular industries. However, not all these companies comply with USGAAP, and that is why they can be significant factors even when one controls for USSUB. Furthermore, the complex relationship between the different variables in the model and each of the sectors makes it very difficult to explain the changes we get in the results by changing the reference category. As a result of this, it is not possible from the adopted model to find those sectors in which companies are most likely to choose USGAAP. Further investigation by controlling for only one industry sector at a time shows that software and media companies are the least likely to use USGAAP. On the other hand, companies in telecommunications, technology and pharmaceuticals tend to use USGAAP more than other companies in other sectors.

The fact that the companies in the MEDIA sector are the least likely to use USGAAP is somewhat puzzling. In fact USGAAP is expected to be more advanced than IAS in dealing with accounting issues in the media sector[390].

Some German companies in the media sector prefer to use some specific options from USGAAP to deal with particular issues, but they do not use the whole set of standards. Constantin Film AG (a Neuer Markt media firm), for example, values its film assets in accordance with USGAAP, although it uses IAS to prepare its financial statements (Constantin Film AG, 2001)[391]. Back and Hilbourne (from Grant Thornton (2002)) report similar exercises by UK media companies (as long as this does not contradict UKGAAP). Stromeyer, Zanker, Londoner and Northover (from ABN-AMRO) (2001, p.2) explain that German film companies "have often exploited accounting options to show high margins, in particular through the capitalisation of film costs and their deferral to later distribution cycles. In theory, this game can be played for years, but auditors are taking a closer look at film amortisation practices. US GAAP rules have been tightened and IAS may follow".

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[390] The sheer size of this sector in the US and the advanced technology used in it lead to this expectation

[391] There is more than one similar example in the media companies in the Neuer Markt.

This explanation suggests that German film companies may prefer to use the less stringent set of accounting standards (that is IAS), whilst using only selected options from USGAAP, which is more stringent. In general, the main aim of testing industry variables is to prove that there is a statistically significant relationship between being in a specific sector and the choice of accounting standards, rather than explaining behaviours in each of these sectors. The significance of some categories in the univariable analysis and the multivariable analysis support the rejection of the null hypothesis and the acceptance of the alternative one.

One of the explanations that can be given for the impact of industry on the choice of accounting standards is what may be called a "herding effect". One simple way to check whether this impact exists in the case of the Neuer Markt or not is to check the choice of the leader companies in each sector and to compare it with the general trend in that sector. Unfortunately, the researcher could not establish any statistical evidence on this effect. Based on the discussion above, the researcher would argue that the most convenient explanation for the industry impact is the importance of the US market for that industry. This means that companies are willing to adopt US GAAP in order to be visible and able to compete in this market. One can also think of it as a part of complete package that German companies should buy in order to operate in the US market.

Leuz (2003) found that two of the industry binary variables were marginally significant factors in the choice between IAS and USGAAP in the Neuer Markt. However, he does not provide any explanation. Tarca (2004), on the other hand, does not find any significant industry factors in determining the choice between IAS and USGAAP either in her full sample (international sample) or her subsample of German firms. Weißenberger et al (ibid), on the other hand, finds that one of motives leading German companies towards the use of international GAAP is the aim of increased comparability with industry peers.

The null hypothesis tested through the variables **AUDID** is rejected at both levels in the univariable and multivariable analysis. The alternative hypothesis that having a Big-5 auditor is positively associated with using USGAAP is one of those based on the main hypothesis that USGAAP leads to a higher quality of disclosure. Kepczyk (2000) reports that Robert K. Elliott-KPMG and Chairman of the AICPA's Board of Directors states that countries like Germany are moving towards US GAAP, as it is the highest standard. Furthermore, Elliott predicts that US GAAP will win because

he thinks that good information makes companies more profitable (means US GAAP). Although this may not be absolutely true (because the general tendency in Germany is towards IAS rather than US GAAP. see Chapter 4). it shows the point of view of a manager in a Big-5 firm and a leading professional body.

As explained in Chapter 4, it is evident that US GAAP is more restrictive than IAS in relation to earnings management. As German companies are well-known for managing earnings (see Chapter 4 for evidence). Big-5 auditors, in general, are expected to support the adoption of a more stringent set of accounting standards that reduce the opportunities for earnings management. Evidence on the important role of the Big-5 in preventing earnings management can be found in Becker. DeFond. Jiambalvo, and Subramanyam (1998); Nelson. Elliot and Tarpley (2000) and Gore. Pope and Singh (2001). In general, it can be said that the Big-5 are more independent and less likely to risk their reputation to satisfy their clients by allowing practices which lead to information of low quality.

Furthermore, it is explained earlier in Chapter 2 that there have been a series of scandals and legal disputes in the Neuer Markt. In such an environment, one would expect the Big-5 to be protecting their reputation by recommending their clients to choose the more stringent set of accounting standards. Another explanation is that the Big-5 firms, which are mainly based in the US, may have more experience with US GAAP than IAS. Serving companies using US GAAP may be cost-saving for them.

Still, one should not disregard the fact that the direction of causality between having a Big-5 auditor and the adoption of US GAAP may be the opposite of what is suggested above. It could be argued that companies that decide on using US GAAP seek help from Big-5 auditors, which are likely to have the required expertise for this. It may be also a signal that they are contracting the best accountancy firms in relation to using US GAAP and hence, signalling that they are following best practice in financial reporting. If we assumed that companies using US GAAP are aiming at the US market, one would expect that using a Big-5 auditor may be a signal of more credibility in the application these accounting principles.

Results of previous research on the choice between IAS and USGAAP do not support this hypothesis. Although Leuz (ibid) does not include this variable in his analysis, he footnotes that he tested this variable in an early version and found that it

was not significant. Tarca (ibid) and Ashbaugh (ibid). on the other hand do not mention this factor.

The null hypothesis on leverage is also rejected all types of analysis. For example, the results of the t-test presented in Table 8.30, show that the mean leverage of IAS companies is significantly higher than that of US GAAP companies. All results, in turn, mean accepting the alternative hypotheses that compliance with USGAAP is negatively related to leverage. One possible explanation for this relationship is that German companies with low leverage may be more dependent on the equity market, and then have the additional need to comply with a more investor-oriented set of accounting standards.

The theoretical explanations provided in Chapter 5 for the expected inverse relationship between leverage and the adoption of IRAS rather than GGAAP was also the basis for applying this hypothesis to the choice of USGAAP rather than IAS. However, the interesting point is that leverage does not prove to be a significant factor at all in the choice between GGAAP and IRAS. Comparing the descriptive statistics of the Neuer Markt in Table 8.1 with those of the Main Market in Table 7.1 or 8.2, one can see that mean leverage in the Main Market is much higher than that in the Neuer Markt (47.4 and 31.2 respectively). This has the clear indication that Main Markt companies are significantly more dependent on debt finance and that the Neuer Markt companies are more dependent on the equity market. This, in turn, may be an indication that the established relationship between companies in the Main Market and their banks is stronger than that between the Neuer Markt companies and their banks. Therefore, banks (lenders) in the Main Market may be more likely to have access to insider information than in the Neuer Markt. In other words, the traditional view of German firms (relying on bank than equity finance) is reflected in the companies of the Main Market, which are much better established in the Market, more than it is in the companies of the Neuer Markt, which are still new growing companies. Vitols (2004, p.1) states that the foundation of Neuer Markt is viewed to a step taken by German policy-makers to move from a bank-based financial system to an equity based system. Furthermore, he also suggests that this foundation is partly related to the fact that "the large privately-owned banks, who find it increasingly difficult to make profits in traditional deposit taking and lending and thus shifting their focus towards fee-based activities such investment banking and

asset management" . Furthermore, one expects young companies (new start ups) to be of higher risk and therefore have less chance to raise debt.

Tarca (ibid) finds that leverage is not a significant factor in the choice between IAS and USGAAP. Leuz (ibid) and Ashbaugh (ibid), on the other hand, do not test for this variable[392]. Still, Leuz (2004) find that low leverage is associated with voluntary segment reporting by German firms.

Results for the Main Market:

The most important factors in the analysis of the Main Market subsample are the free float (FREFLOAT) and US listing (USLIST). As mentioned earlier, listing on the US has proved to be the most important predictor in the previous literature.

The significant positive relationship between choosing USGAAP and the free float leads to accepting the alternative hypothesis that companies with high free float are more likely to adopt US GAAP. One of the main explanations of the impact of free float on accounting choices is the increase in agency costs with the proportion of free float which, in turn, means more pressure for monitoring managers' behaviour. US - GAAP, which is more stringent and requires more disclosures than IAS, may be a better choice, especially as it is perceived to be more investor-oriented. Fresenius AG (2002) explains that it prepared its consolidated accounts for the year ending on December 31, 2002 in accordance with US GAAP for the first time, because they believe that US GAAP rules are more strongly oriented to shareholders than are German accounting rules according to the Commercial Law (HGB), which are aimed at the protection of creditors.

It might be interesting to ask why free float is important in choosing US GAAP in the Main Market, but not in the Neuer Market. The descriptive statistics of free float in both markets (Table 7.1, 8.1 and 8.2) do not appear to be substantially different from each other.

At the level of univariable analysis, Leuz (ibid) finds that there is a significant difference in free float across the IAS group and the USGAAP group. However, it was only marginally significant in his multivariable model (in only one model of two). Furthermore, Leuz expects free float to be positively associated with USGAAP

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[392] In an earlier version of his paper, Leuz (ibid) finds that leverage is an insignificant factor.

(as is the case in our results). but his results showed a negative association. Yet. he also does not provide a clear explanation for his finding.

As mentioned earlier. the limited number of US GAAP companies may have influenced the results in this part. Therefore. the researcher is unable to speculate as to whether the differences in the results between the two parts of the analysis are the result of institutional differences.

Results of previous studies on the choice between USGAAP and IAS are presented in Chapter 5. Apart from Ashbaugh (ibid), the limited empirical studies on this subject failed to find many significant factors. In general, US-listing was found to be the most significant factor (even in the survey studies). Leuz (ibid) finds that future financial needs (measured by sales growth) are also an important predictor. Furthermore, Tarca (ibid) finds that foreign sales are a marginally significant factor in choosing IAS rather than USGAAP. Ashbaugh, on the other hand, finds a wider variety of important predictors. She finds that compliance with USGAAP is positively associated with the number of foreign stock exchanges the company is listed on, listing in the US and the degree of inferiority of domestic GAAP to the USGAAP. Although the current research does not test for some of the variables tested in the above-mentioned studies such as future financial needs and the issuing of seasoned equity, it tests other variables which were not examined in these studies.

The intention to get listed in the US: the literature on the choice between IAS and USGAAP suggests that the intention to get listed in the US may be a significant factor affecting a company's decision to comply with USGAAP (Leuz, 2003; Weißenberger, Stahl and Vorstius, 2004). However, there is a problem in finding a proxy to measure this intention. This is simply because intentions are not quantifiable and tangible. The simplest way to measure such a variable is to survey managers in the respective companies (which is not within the scope of the methodology of the current research). However, this can be partially explored by examining new listings of German companies on NYSE during the years following 2001 (the sample year). It was possible for the researcher to check the latest list of German companies quoted on NYSE (November 2004). This list showed that there are only two German firms that have listed their shares on NYSE since the end of 2001. These two companies are Altana AG and BAYER AG. Both companies are in the Pharmaceuticals and Chemicals sector and using IAS (for the year ending in 2001). Although this very small number of companies does not allow us to test this

assumption statistically, their compliance with IAS does not support this assumption. Of course the period since 2001 may not provide enough time for intentions to list in the US to be achieved. Companies may adopt a longer time horizon. Others may be keen to preserve an option to list in the US, rather than having a definite intention.

It is explained above in the Neuer Markt section that having a US subsidiary is not important in the choice of USGAAP in the Main Market, although it is important in the choice of IRAS. From 128 German companies with US subsidiaries, 62 adopt IRAS, of which 44 uses IAS. It is understandable that 18 out of 23 companies using US GAAP have subsidiaries in the US; nevertheless it is somehow puzzling that the 44 companies decided to use IAS rather than US GAAP. Still, the multinomial model presented in chapter 7 shows that US SUB is important in the choice between G GAAP and US GAAP and between G GAAP and IAS, but not between IAS and US GAAP. The question is: why is USSUB a significant determinant of choosing US GAAP in the Neuer Markt, but not the Main Market? One possible answer is that the relative importance of US subsidiaries for the Main Market companies is not significant enough to influence the decision on choosing US GAAP. In other words, the cost of adopting US GAAP may be higher than the benefit when companies when the subsidiaries in US are small or when the company have minor interests in the US Market. This leads us to the need for further investigation of the relative significance of US subsidiaries which is suggested earlier and which is an option for further research.

9 Chapter 9: Summary, Conclusions and Suggestions for further research

9.1 Summary:

Since 1998, German listed companies (Main Market[393]) have been allowed by law to use internationally recognised accounting standards (IRAS - IAS or USGAAP) as a substitute for German GAAP (GGAAP) for the preparation of their consolidated financial statements. Companies in the Neuer Markt, on the other hand, were[394] required to prepare their consolidated accounts in accordance with either IAS or USGAAP. This flexibility in the choice of GAAP raises questions about the factors explaining them.

Inspired by the literature on voluntary disclosure and on GAAP choices, the current research endeavours to investigate empirically the relationship between specific firm characteristics and the choice of one of the allowable GAAPs.

Statistical analysis is designed at three levels: univariable, bivariable and multivariable analysis. Whereas significance tests are used to investigate any significant differences across all three established groups in terms of specific factors, multivariable models explore the association between these factors collectively and the choice of a particular set of accounting rules.

This empirical work comprises three clusters[395] of statistical analysis. The first cluster of analysis is intended to examine the choice between GGAAP and IRAS, which only takes place in the Main Market (Chapter 7). The second cluster is intended to examine the choice between IAS and US GAAP, which takes place in both the Main Market and the Neuer Markt (Chapter 8). The third cluster of statistical analysis is concerned with the choice between the three groups of accounting standards: GGAAP, IAS and US-GAAP, which takes place in the Main Market.

The hypotheses postulated to explain the choice between GGAAP and IRAS can be summarised in one null form as the following: the tendency to comply with IRAS by German listed firms is either not associated with size, being in a quality segment,

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[393] Recall that this is a name chosen by the researcher to include all segments in FWB (Frankfurt exchange), except for the Neuer Markt.

[394] The Neuer Markt does not exist any more (see Chapter 2)

[395] The word cluster is used here to include all the different types of statistical techniques used to analyse each choice.

equity capital being held by managers[396]. the proportion of free float. leverage. profitability. auditor identity. listing status. internationality of business. internationality of investors and industry type or is negatively related to size. being in a quality segment, the proportion of free float. profitability. having a Big-5 auditor. listing abroad, having foreign subsidiaries. having foreign investors / or positively related with management ownership and leverage.

For the choice between IAS and USGAAP, on the other hand. two main types of hypotheses are tested. The first type is those built on a basic assumption that US GAAP is more stringent and requires more disclosures than IAS. These hypotheses are, in general, almost similar to the ones above tested on the choice between GGAAP and IRAS. They can also be summarised in one null hypotheses as the following: the tendency of German companies to choose USGAAP is either not associated with size, being in a quality segment, management ownership, the proportion of free float, leverage, profitability, auditor identity. listing status, and industry type or is negatively related to size, being in a quality segment, the proportion of free float, profitability, having a Big-5 auditor / or positively related with the proportion of equity capital held by mangers[397] and leverage. We notice that in this part there are no hypotheses on the impact of internationality[398]. The second type of hypotheses on the choice of USGAAP or IAS is based on the presence of a U.S. element. In short, these hypotheses can be summarised in the following null form: that the tendency to comply with USGAAP rather than IAS is either not associated with listing in the U.S., having U.S. investors, having U.S. subsidiaries and U.S. managers or negatively related to them. It should also be remembered that analysis on the choice between IAS and USGAAP is run in two separate parts: Neuer Markt and Main Markt, although the analysis on the Main Market in this part is considered somewhat informal[399].

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[396] The original hypothesis was with the proportion of equity capital held by managers, but for statistical reasons this variable is transformed into a binary variable. Still the result of using this variable in its continuous form gives similar results.

[397] In contrast with the Main Market, the management ownership variable is used in its continuous form.

[398] There is not enough theoretical justification for this. It was more logical to hypothesise that internationality will lead to the use of IAS rather than USGAAP. This was informally tested and proved to be significant only at the univariable level.

[399] This is because of the limited number of companies using USGAAP.

9.2 Findings and Conclusions:

First: German companies listed in the Main Market are statistically more likely to be using IRAS, if they are:

- Large in terms of total assets, employee numbers and turnover[400]. Still, the relationship between size the tendency to adopt IRAS is not linear, which means that tendency of companies categorised as Medium to adopt IRAS is not statistically significantly higher than that of those categorised as Small.
- Classified in a quality segment (DAX, MDAX or SMAX).
- Having at least one foreign manager on either the supervisory board or the management board. This presence has been considered as a proxy for the importance of the foreign subsidiaries and, in turn, a proxy for internationality. Although having a subsidiary abroad is also marginally significant, it was excluded from the model because of its redundancy and because having a manager is chosen as a substitute. Hence, it can be concluded that the tendency of German listed firms to use IRAS increases with the degree of internationality (measured by having foreign managers or subsidiaries abroad)
- Audited by a Big-5 auditor: Deloitte and Touche, Ernst and Young, KPMG, Arthur Andersen or PricewaterhouseCoopers.
- Having a proportion of its equity owned by members of the supervisory board or the management board. The conclusion in the case where the variable was continuous (explained in footnote 4 above) would be: 'the tendency of German listed companies to comply with IRAS increases with the proportion of management ownership'.

Furthermore, if one agrees that the final adopted multivariable model should be the basis for the final decision on accepting or rejecting the null hypotheses[401], we should conclude that:

- The tendency of German companies listed on the Main Market to comply with IRAS is not statistically associated with free float, leverage, profitability, listing abroad, foreign investors and industry type.

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[400] Only one size variable included in the multivariable model, to avoid multicollinearity

[401] Recall that all decisions on rejection are taken using a significance level of .05. Null hypotheses are rejected when results are significant at levels of more than .05.

According to both univariable models and other alternative multivariable models, those variables underlined in the statement above are other important factors. However, it may not be statistically correct to draw conclusions from these results. The reason is because they are not in the adopted model which controls for all the variables that expected to be important factors[402].

Second: the tendency of the Neuer Markt companies to adopt USGAAP is statistically associated with:

- Low levels of leverage. Companies with low leverage are more likely to be using USGAAP. This conclusion is consistent with the theory provided earlier to support the hypothesis on leverage.
- Low levels of profitability. It is explained in Chapter 8 that this is opposite to the alternative hypothesis which expects a positive relationship between profitability and the tendency to comply with USGAAP. This may be related to a weakness in the theoretical justification of this hypothesis (discussed in Chapter 8). This may also be related to the fact that the measure of profitability is not utterly independent of the GAAP used. In other words, profits reported under IAS may tend to be higher than those reported under US GAAP. However, a lack of literature in this particular area of research does not allow us to confirm this[403].
- Having a subsidiary in the U.S. This means that companies having at least one subsidiary in the US are more likely to be using USGAAP than those which do not.
- Having significant[404] U.S investors among their shareholders.
- Having a Big-5 auditor.
- Being in particular industry sectors. Informal analysis[405] shows that software and media companies are the least likely to use USGAAP. On the other hand,

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[402] A group of statisticians advised the researcher that conclusions should be drawn on the basis on multivariable analysis in this type of research where the hypotheses are described to be multivariate.

[403] The researcher emailed significant researchers interested in this field: Christian Leuz (University of Pennsylvania, U.S.A), Holly Ashbaugh (University of Wisconsin, U.S.A) and Ann Tarca (University of Western Australia, Australia). They all agree on the lack of literature on this side and that they are not aware of any studies that may decide which one of the two GAAPs (IAS or USGAAP) produces lower profits than the other.

[404] See Chapter 6 for explanation of significant investors.

[405] As explained in Chapter 8, changes in the reference category (the sector to which other sectors can be compared in the multivariable model) gives different results. Further investigation by controlling for only one industry sector at a time can help with comparing each sector with rest of sectors.

companies in each of telecommunications. technology and pharmaceuticals tend to use USGAAP more than companies in other sectors.

While statistical analysis shows that size and free float are not associated with the choice between IAS and USGAAP in the Neuer Markt at all. univariable analysis shows that the proportion of management ownership is negatively associated with the choice of US GAAP. This is consistent with the alternative hypothesis explained and stated in Chapter 5. Yet, the results of the multivariable model do not support this.

Similar to the conclusions on the Main Market, the conclusions above are based on the results of the multivariable analysis. Hence, it should be concluded that:

- The tendency to comply with US GAAP by German companies in the Neuer Markt is not associated with size, the proportion of management ownership, and free float.

Furthermore, it was not possible to test for listing in the US because of the very limited number of Neuer Markt companies listed in the US (or even other countries). However, all the Neuer Markt companies listed in the US adopt USGAAP. This gives some support to the alternative hypothesis, although not statistical evidence.

Third: statistical analysis on the choice between IAS and US GAAP by the companies in the Main market does not provide much support to the vast majority of the hypotheses. It was not even possible to establish a multivariable model similar to that established for the Neuer Markt data. However, the factor which proved to be a highly significant determinant of the choice of US GAAP is U.S listing. What is reassuring about this limited result is that U.S. listing is the only factor on which there is some kind of consensus in the related literature (see Chapter 5). Furthermore, free float is also a significant factor in the choice of US GAAP. Yet, it is only marginally significant when included with USLIST in the same model. One possible explanation of the importance of free float in the choice of US GAAP is that companies with higher free float are more investor oriented and. therefore, may also be aiming at the US stock market which is known to have large capacity.

Therefore, the main conclusion of this part of the analysis would be:

- The tendency to use US GAAP (rather than IAS) by German companies listed in the Main Market is highly associated with being listed in the US and having high free float.

Fourth: the third part of analysis is of the choice in the Main Market between the three GAAPs: GGAAP, IAS or US GAAP (as three separate sets).

Conclusions on this part are basically drawn from the multinomial model presented in Chapter 7:

- The tendency of companies in the Main Market to choose IAS or US GAAP rather than GGAAP is positively associated with having a subsidiary in the US.
- The tendency of companies in the Main market to choose US GAAP rather than GGAAP is positively associated with the proportion of free float.
- The tendency of companies in the Main market to choose US GAAP rather than GGAAP is positively associated with listing in the US.

It can be seen from these findings that only a few variables that are statistically associated with the choice between US GAAP and GGAAP in the Main Markt. Having a small number of US GAAP companies in the Main Market is one reason why there is such a small number of significant factors[406].

9.3 Suggestions for further research:

Only a few studies have been conducted in the area of GAAP choices and more investigation is needed to support the results of these studies. For instance, the current work needs to be supported by a survey as a data resource to cover many points where speculations are provided on different issues. A very recent work by Weißenberger, Stahl, and Vorstius (2004) surveys a sample of German companies on the choice of IAS and USGAAP, combining that with some statistical analysis. A work which contains two types of data (financial statements and survey) could be more powerful, where the results complement each other.

Factors examined in this study, which are based on previous literature, explain only a small amount of the variation of the dependent variable (accounting choice), this

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[406] The multinomial model in this case was not supposed to contain more than 3 factors (see Chapter 7). Furthermore the concentration of this analysis was to find the factors which are related with choice between US GAAP and each of IAS or GGAAP and was not concerned finding the factors associated with the choice between GGAAP and IAS.

implies that there are still more factors to be examined. Examples of factors that could be considered in further research are: capital intensity. relative importance of foreign subsidiaries and the influence of banks.

Another factor which may be considered in future research is the usefulness of IAS or US GAAP for the purposes of internal reporting. Surveys by PricewaterhouseCoopers (2002b) and Mazars (2003) indicate that a large majority European managers (including German CFOs) believe that the use of IAS can benefit them for internal reporting purposes. It is difficult to measure directly the impact of this belief on actual adoption of IAS. However, this impact may be significant in companies with complex organisational structure. Singhvi and Desai (1971), for example, argue that in large firms, detailed information is already produced for internal purposes. This may mean that in the current research the impact of this factor may have partially been captured by the size and internationality variables, where the complexity of firm structure increases. However, it may be possible to devise a better proxy for this impact which could be used in future research.

The year 2005 is a very important year in the history of accounting standards where listed companies in all EU member states should prepare their consolidated accounts according to IFRS (IAS). Many German companies have adopted IAS in the expectation that they will be the dominant standards in Europe. It would interesting to research the different dimensions of the actual implementation of IAS for the year 2005, for instance, the observance of these standards in German companies which have chosen to comply with IAS prior to 2005 compared with new adopters. Such research would reveal what kind of benefits early voluntary compliance can have. For example, one would expect higher compliance with IAS by early adopters and more difficulties to be faced in implementing the system for new adopters. The role of auditors at this transitional stage is important and needs to be investigated too. One question is: are dominant auditors (say Big-4) more advantageous for clients than non-big 4 auditors in this transitional stage?

It would be useful, too, to investigate the cost element in the preparations for the adoption of IAS, on which literature is scarce. It may not be easy to measure these costs in companies which have already adopted IAS for years. However, it would be easier to find such information when large numbers of firms convert to these

standards at once[407]. Companies which are forced to use IAS may be more concerned with the cost argument than those who do this voluntarily. Then it is appealing to investigate whether they spend less on this, and whether this would affect the quality of their compliance. Highlighting the costs of the adoption of IAS could be very useful for policy makers and researchers in this area.

There is some evidence in the literature that IAS does not (as much as US GAAP) curb income smoothing by German firms (see Chapter 4). Furthermore, a report published by the Institute of Chartered Accountants in England & Wales (ICAEW) notes that aggressive earnings management in UK financial reporting is likely to increase with the introduction of IFRSs (ICAEW, 2004). This implies the need to undertake further research to examine the truthfulness of these claims.

The extant literature provides some empirical work on the comparisons between IAS and US GAAP in terms of value relevance. However, there is a clear lack of literature on the differences between the two GAAPs in terms of conservatism, reported profits and financial position (including reported leverage and total assets). Investigations are needed to conclude whether, for example, profits reported under US GAAP are likely to be lower (or higher) than those reported under IAS. Information on this issue would be useful for both researchers in this particular field and for international committees interested in harmonising accounting standards.

9.4 Contributions:

To the researcher's knowledge, this is the only study in this particular area of research that simultaneously tests the choice of accounting standards in these two institutionally different German sub-markets. This research provides the opportunity to compare how different the factors are that influence the strategic managerial decision of choosing a particular GAAP in the two sub-markets.

The current research tests some hypotheses that have not been tested before in similar research, such as the presence of foreign investors and being in a quality segment. Furthermore, previous studies on the choice between IAS and US GAAP ignored any US element (apart from US listing), such as having US subsidiaries, US managers and US investors, which are considered here and proved to be important factors. In addition to this, many proxies are also tested for the first time in this type of study, such as foreign subsidiaries, foreign managers and management ownership.

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[407] In simple words, this is intended to say that more information will be available for researchers.

As the results of this study indicate which companies are more likely to switch to IRAS, they also imply which companies are more likely to continue using German GAAP. This may be a useful starting point for monitoring the level and the quality of compliance with IAS after the enforcement of IAS in 2005. Companies that tend to stick to GGAAP may not be in favour of using particular IAS requirements and have incentives to avoid using them. This, in turn, may be reflected in the adequacy of their compliance, when they are forced to do so. Therefore, this type of study may complement another stream of studies which examines the level of compliance with IAS, such as Street and Gray (2002).

However, one may still wonder what the lasting contribution this study makes, once German listed companies are forced to comply with IAS in respect of their group accounts from the year 2005. In general, this work may be considered as a small contribution to the very limited literature on the choice of GAAP. This contribution is reflected in several different ways: first, the results confirm the importance of factors such as size, internationality and auditor type, which are consistent with the expectations of theory incorporated in this study's hypotheses and generally consistent with previous results. Although size is an important factor in the literature, this study shows that the relationship with size can be non-linear, where the tendency to comply with IRAS decreases amongst companies classified as medium-sized.

Results on management ownership, on the other hand, were not as expected by the conventional theoretical explanations based on agency theory. However, the researcher provides an explanation for this, which is based on factual arguments such as the opinions of European and German CFOs about IRAS (discussed in Chapter 7). The inverse influence of Leverage on the choice of US GAAP is also a result which may be of significant interest to researchers in this particular area, simply because results on leverage in the literature are contradictory. Another important point which this research adds to the extant literature is the evidence on the influence of stock market classifications such as DAX, MDAX and SMAX on the quality of companies' reporting (voluntary compliance with IRAS). This study also provides reasonable evidence that having foreign managers may be a good (and possibly the best) proxy for internationality and may be a good indication of the importance of foreign subsidiaries. Finally, one should bear in mind that most of the hypotheses and results of this study may be employed as sound bases for similar hypotheses in future studies on voluntary compliance with IRAS by **non-EU** companies. Still, one

should emphasise that institutional differences and other differences between countries could lead to different results. In other words, the researcher does not claim that the models produced in this research are automatically valid for other countries because their relevance needs to be reviewed in the light of circumstances. Nevertheless they could be considered when examining the results of future studies.

Finally, most of the factors tested here for the voluntary adoption of IRAS are widely used in the literature on voluntary disclosure, because of the clear parallel between these two managerial decisions. Therefore, the results of the current research can be seen as a complement to the body of literature on voluntary disclosure. In this body of literature there is general consistency in the results about the particular factors such as size, internationality, cross listing and auditor type (generally the same ones mentioned above in the part about GAAP choice). which are associated with higher disclosure Although the results of this research reinforce the existing perception of the impact of size, internationality and auditor type on voluntary disclosure, it casts doubt on the inclusion of cross-listing, as it makes it clear that this factor is not important when you control for size. Moreover. the influence of size is not as simple as it is claimed to be in the extant disclosure literature. The non-linearity that exists in the relationship between firm size and the choice of GAAP (as mentioned above) implies that the same type of relationship may exist between firm size and the extent of voluntary disclosure. The influence of quality segments, which have not been tested before in this type of literature[408], may also be considered as a potential factor influencing companies' disclosures. Leverage is also one of the commonly tested factors for influencing voluntary disclosure; nevertheless, there is a lack of clear evidence on the influence of this factor. The current results show that leverage is negatively associated with choosing US GAAP over IAS which, in turn, implies that it may have the same impact on the levels of voluntary disclosure.

Although the disclosure literature is built up from studies conducted in different countries from across the world, their results. in general, appear to be in line with each other and with the expectations of theory. The clear agreement between most of the results of this study and those in the disclosure literature. therefore, may have some international implications for the relationship between firm characteristics (wherever they are) and their decisions concerning accounting practices (such as

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[408] At least to the best of the researcher's knowledge

extensive voluntary disclosures or the adoption of a more demanding GAAP). In other words, results of this research may be of help is studying the impact of firm characteristics on voluntary accounting disclosure in other countries.

10 Appendices:

10.1 Appendix 1: Main Market companies included in the study (ordered according to their GAAP choice)

No	Company	Sector	GAAP	Segment
1	A. Moksel AG	GGAAP	Unclassified	Food and Beverages
2	A.A.A. Aktiengesellschaft	GGAAP	Unclassified	Finance
3	a.i.s AG	GGAAP	Unclassified	Industry
4	AdCapital AG	GGAAP	SMAX	Industry
5	Adolf Ahlers AG	GGAAP	SMAX	Consumer Cyclical
6	Albis Leasing AG	GGAAP	Unclassified	Finance
7	Alcatel SEL AG	GGAAP	Unclassified	Telecommunications
8	Allbecon AG	GGAAP	SMAX	Industry
9	Andreae-Noris-Zahn AG	GGAAP	Unclassified	Pharmaceuticals
10	Armstrong Dw AG	GGAAP	Unclassified	Construction
11	Autania AG	GGAAP	Unclassified	Industry
12	AVA AG	GGAAP	MDAX	Retail
13	AWD AG	GGAAP	MDAX	Finance
14	Axel Springer Verlag AG	GGAAP	Unclassified	Media
15	B & L Immobilien AG	GGAAP	Unclassified	Finance
16	Bau-Verein zu Hamburg AG	GGAAP	SMAX	Finance
17	BayWa AG München	GGAAP	Unclassified	Construction
18	BBS Kraftfahrzeugtechnik AG	GGAAP	Unclassified	Automobile
19	Beate Uhse AG	GGAAP	MDAX	Retail
20	Berentzen-Gruppe AG	GGAAP	SMAX	Food and Beverages
21	BERU AG	GGAAP	MDAX	Automobile
22	BHS Tabletop AG	GGAAP	Unclassified	Retail
23	BIEN-HAUS AG	GGAAP	Unclassified	Construction
24	Bijou Brigitte modische Accessoires AG	GGAAP	Unclassified	Retail
25	Biotest AG	GGAAP	SMAX	Pharmaceuticals
26	BMP AG	GGAAP	SMAX	Industry
27	Borussia Dortmund Gmbh & Co. KGaA	GGAAP	Unclassified	Media
28	Brilliant AG	GGAAP	Unclassified	Technology
29	Brüder Mannesmann AG	GGAAP	SMAX	Industry
30	Buderus AG	GGAAP	MDAX	Machinary
31	cash.medien AG	GGAAP	Unclassified	Media
32	CeWe Color Holding AG	GGAAP	SMAX	Retail
33	Cinemaxx AG	GGAAP	SMAX	Media
34	CompuGroup Holding AG	GGAAP	Unclassified	Software
35	Condomi AG	GGAAP	SMAX	Retail
36	Cordier, Robert AG	GGAAP	Unclassified	Basic Resources
37	Creaton AG	GGAAP	SMAX	Construction
38	Curtis 1000 Europe AG	GGAAP	Unclassified	Retail
39	Custodia Holding AG	GGAAP	Unclassified	Food and Beverages
40	Deutsche Steinzeug Cremer und Breuer AG	GGAAP	SMAX	Construction
41	Deutscher Eisenhandel AG	GGAAP	Unclassified	Basic Resources
42	Deutz AG	GGAAP	MDAX	Machinary

43	Didier-Werke AG	GGAAP	Unclassified	Basic Resources
44	Douglas Holding AG	GGAAP	MDAX	Retail
45	Dr. Scheller Cosmetics AG	GGAAP	SMAX	Pharmaceuticals
46	Drägerwerk AG	GGAAP	Unclassified	Telecommunications
47	Edscha AG	GGAAP	SMAX	Automobile
48	effeff Fritz Fuss GmbH & Co. KGaA	GGAAP	Unclassified	Technology
49	Ehlebracht AG	GGAAP	Unclassified	Construction
50	Elexis AG	GGAAP	SMAX	Telecommunications
51	Elringklinger AG	GGAAP	Unclassified	Automobile
52	Energie Baden-Württemberg AG	GGAAP	Unclassified	Utilities
53	Felten & Guilleaume Energietechnik AG	GGAAP	Unclassified	Telecommunications
54	Fielmann AG	GGAAP	MDAX	Retail
55	Fresenius AG	GGAAP	MDAX	Pharmaceuticals
56	Friatec AG Keramik- und Kunstoffwerke	GGAAP	Unclassified	Industry
57	Fuchs Petrolub AG Oel + Chemie	GGAAP	SMAX	Chemicals
58	Garant Schuh AG	GGAAP	SMAX	Consumer Cyclical
59	Gardena AG	GGAAP	SMAX	Consumer Cyclical
60	GEHE AG	GGAAP	MDAX	Pharmaceuticals
61	GESCO AG	GGAAP	SMAX	Industry
62	GfK AG	GGAAP	MDAX	Industry
63	Gildemeister AG	GGAAP	MDAX	Machinary
64	GLUNZ AG	GGAAP	Unclassified	Construction
65	Gold-Zack AG	GGAAP	MDAX	Finance
66	Grammer AG	GGAAP	SMAX	Automobile
67	Graphitwerk Kropfmühl AG	GGAAP	Unclassified	Basic Resources
68	Hach AG	GGAAP	SMAX	Retail
69	Hamburger Hochbahn AG	GGAAP	Unclassified	Transportation
70	Hans Einhell AG	GGAAP	SMAX	Retail
71	Heinkel AG	GGAAP	SMAX	Machinary
72	Herlitz AG	GGAAP	Unclassified	Retail
73	HIT International Trading AG	GGAAP	Unclassified	Retail
74	Holsten-Brauerei AG	GGAAP	SMAX	Food and Beverages
75	Hornbach Holding AG	GGAAP	SMAX	Retail
76	Hucke AG	GGAAP	Unclassified	Consumer Cyclical
77	Hymer AG	GGAAP	SMAX	Automobile
78	Indus Holding AG	GGAAP	SMAX	Industry
79	Innotec TSS AG	GGAAP	SMAX	Construction
80	Interseroh AG	GGAAP	Unclassified	Industry
81	IVG Holding AG	GGAAP	MDAX	Finance
82	IWKA AG	GGAAP	MDAX	Machinary
83	Jean Pascale AG	GGAAP	Unclassified	Retail
84	Jenoptik AG	GGAAP	MDAX	Telecommunications
85	Jil Sander AG	GGAAP	Unclassified	Consumer Cyclical
86	K&M Möbel AG	GGAAP	SMAX	Consumer Cyclical
87	K+S AG	GGAAP	MDAX	Basic Resources
88	Kampa Haus AG	GGAAP	SMAX	Construction
89	Kamps AG	GGAAP	MDAX	Food and Beverages
90	Kässbohrer Geländefahrzeug AG	GGAAP	SMAX	Machinary
91	Koenig & Bauer-Albert AG	GGAAP	MDAX	Machinary
92	Kögel Fahrzeugwerke AG	GGAAP	Unclassified	Automobile

93	Köhler & Krenzer Fashion AG	GGAAP	SMAX	Consumer Cyclical
94	Konrad Hornschuch AG	GGAAP	Unclassified	Retail
95	Krones AG Hermann Kronseder Maschinenfabrik	GGAAP	MDAX	Machinary
96	KSB AG	GGAAP	Unclassified	Machinary
97	Leica Camera AG	GGAAP	Unclassified	Telecommunications
98	Leifheit AG	GGAAP	SMAX	Retail
99	Leoni AG	GGAAP	SMAX	Telecommunications
100	Ludwig Beck AG	GGAAP	SMAX	Retail
101	M.A.X. Holding AG	GGAAP	SMAX	Industry
102	Maternus - Kliniken AG	GGAAP	SMAX	Pharmaceuticals
103	MCS Systeme AG	GGAAP	Unclassified	Telecommunications
104	MD Bau Holding AG	GGAAP	Unclassified	Construction
105	Mediclin AG	GGAAP	SMAX	Pharmaceuticals
106	Mineralbrunnen AG	GGAAP	Unclassified	Food and Beverages
107	Möbel Walther AG	GGAAP	SMAX	Consumer Cyclical
108	Mologen Holding AG	GGAAP	Unclassified	Pharmaceuticals
109	Neckarwerke Elektrizitätsversorgungs	GGAAP	Unclassified	Utilities
110	Neschen AG	GGAAP	SMAX	Industry
111	Norddeutsche Affinerie AG	GGAAP	MDAX	Basic Resources
112	PA Power Automation AG	GGAAP	SMAX	Telecommunications
113	Park & Bellheimer AG	GGAAP	Unclassified	Food and Beverages
114	Pegasus Beteiligungen AG	GGAAP	Unclassified	Finance
115	Pfleiderer AG	GGAAP	SMAX	Construction
116	Phoenix AG	GGAAP	MDAX	Automobile
117	Piper AG	GGAAP	Unclassified	Transportation
118	Pirelli Deutschland AG	GGAAP	Unclassified	Automobile
119	plettac AG	GGAAP	SMAX	Construction
120	Pongs & Zahn AG	GGAAP	SMAX	Industry
121	Porsche AG	GGAAP	Unclassified	Automobile
122	Porta Systems AG	GGAAP	SMAX	Construction
123	Procon	GGAAP	SMAX	Media
124	Progress Werk AG	GGAAP	SMAX	Automobile
125	ProSiebenSAT.1 Media AG	GGAAP	MDAX	Media
126	R.Stahl AG	GGAAP	SMAX	Telecommunications
127	Rinol AG	GGAAP	SMAX	Construction
128	Rohwedder AG	GGAAP	SMAX	Machinary
129	Rosenthal AG	GGAAP	Unclassified	Retail
130	Rothenberger AG	GGAAP	Unclassified	Machinary
131	SAI Automotive AG	GGAAP	Unclassified	Automobile
132	Schaltbau AG	GGAAP	Unclassified	Telecommunications
133	Schleicher AG	GGAAP	Unclassified	Telecommunications
134	Schlott AG	GGAAP	SMAX	Industry
135	Schön & Cie. AG	GGAAP	Unclassified	Machinary
136	Schuler AG	GGAAP	SMAX	Machinary
137	Schwälbchen Molkerei Jakob Berz AG	GGAAP	Unclassified	Food and Beverages
138	Simona AG	GGAAP	Unclassified	Chemicals
139	Sixt AG	GGAAP	MDAX	Transportation
140	Software AG	GGAAP	MDAX	Software
141	Spar Handels AG	GGAAP	Unclassified	Retail
142	Stada Arzneimittel AG	GGAAP	MDAX	Pharmaceuticals

143	STO AG	GGAAP	SMAX	Construction
144	Stollwerck AG	GGAAP	Unclassified	Food and Beverages
145	STRABAG AG	GGAAP	Unclassified	Construction
146	Stuttgarter Hofbräu AG	GGAAP	Unclassified	Food and Beverages
147	TAG Tegernseebahn Immobilien AG	GGAAP	Unclassified	Finance
148	Takkt AG	GGAAP	SMAX	Retail
149	tecis Holding AG	GGAAP	MDAX	Finance
150	TIAG Tabbert-Industrie AG	GGAAP	Unclassified	Automobile
151	Uzin Utz AG	GGAAP	SMAX	Pharmaceuticals
152	VARTA AG	GGAAP	Unclassified	Telecommunications
153	VBH Holding AG	GGAAP	Unclassified	Construction
154	VGT AG	GGAAP	Unclassified	Industry
155	Villeroy & Boch AG	GGAAP	SMAX	Construction
156	VK Mühlen AG	GGAAP	Unclassified	Food and Beverages
157	Vogt electronic AG	GGAAP	SMAX	Telecommunications
158	Wanderer-Werke AG	GGAAP	Unclassified	Industry
159	WCM Beteiligungs- und Grundbesitz	GGAAP	MDAX	Finance
160	Webac Holding AG	GGAAP	Unclassified	Finance
161	WERU AG	GGAAP	Unclassified	Construction
162	Westag & Getalit AG	GGAAP	Unclassified	Construction
163	Winkler + Dünnebier AG	GGAAP	SMAX	Machinary
164	WMF AG	GGAAP	SMAX	Retail
165	ABB	GGAAP	Unclassified	Machinary
166	Actris	GGAAP	Unclassified	Food and Beverages
167	Adler Real Estate AG	GGAAP	Unclassified	Finance
168	Allweiler	GGAAP	Unclassified	Machinary
169	ALNO AG	GGAAP	Unclassified	Consumer Cyclical
170	B.A.U.M	GGAAP	Unclassified	Media
171	B.U.S	GGAAP	SMAX	Technology
172	BASF AG	GGAAP	DAX	Chemicals
173	BilTrain AG	GGAAP	Unclassified	Industry
174	Brau und Brunnen AG	GGAAP	SMAX	Food and Beverages
175	CBB Holding AG	GGAAP	Unclassified	Finance
176	Curanum Bonifatius AG	GGAAP	SMAX	Pharmaceuticals
177	Deutsche Euroshop AG	GGAAP	Unclassified	Finance
178	Deutsche Real Estate AG	GGAAP	Unclassified	Finance
179	Deutsche Telekom AG	GGAAP	DAX	Technology
180	Eichborn AG	GGAAP	SMAX	Media
181	Gelsenwasser AG	GGAAP	Unclassified	Utilities
182	Gerry Weber International AG	GGAAP	SMAX	Consumer Cyclical
183	H&R Wasag	GGAAP	Unclassified	Chemicals
184	Hugo Boss AG	GGAAP	MDAX	Consumer Cyclical
185	IFA Hotel & Touristik AG	GGAAP	Unclassified	Transportation
186	Interglas Technologies	GGAAP	Unclassified	Telecommunications
187	Kap Beteiligungs AG	GGAAP	Unclassified	Industry
188	Kulmbacher Brauerei AG	GGAAP	Unclassified	Food and Beverages
189	Linde AG	GGAAP	DAX	Machinary
190	Lindner Holding KGAA	GGAAP	Unclassified	Construction
191	Marschollek, Laut. U.P	GGAAP	DAX	Finance
192	Maschinenfabrik Berthold Hermle AG	GGAAP	Unclassified	Machinary
193	M-Tech Technologie und Beteiligungs	GGAAP	Unclassified	Telecommunications

194	Ott Stumpf AG	GGAAP	Unclassified	Finance
195	Radeberger AG	GGAAP	Unclassified	Food and Beverages
196	Ruetgers AG	GGAAP	Unclassified	Chemicals
197	SCA Hygiene Products AG	GGAAP	Unclassified	Basic Resources
198	Sektkellerei Schloss AG	GGAAP	Unclassified	Food and Beverages
199	Solar Fabrik	GGAAP	Unclassified	Utilities
200	Surteco AG	GGAAP	SMAX	Consumer Cyclical
201	Vattenfall Europe AG	GGAAP	Unclassified	Utilities
202	VDN e AG	GGAAP	Unclassified	Basic Resources
203	Walter AG	GGAAP	SMAX	Machinary
204	Walter Bau	GGAAP	Unclassified	Construction
205	Wasgau Produktions & Handels AG	GGAAP	Unclassified	Retail
206	ALTANA AG	IAS	MDAX	Pharmaceuticals
207	Amadeus AG	IAS	SMAX	Industry
208	Beiersdorf AG	IAS	MDAX	Pharmaceuticals
209	Bilfinger Berger AG	IAS	MDAX	Construction
210	Burgbad AG	IAS	SMAX	Construction
211	Deutsche Börse AG	IAS	MDAX	Finance
212	DIS Deutscher Industrie Service AG	IAS	SMAX	Industry
213	Eurobike AG	IAS	SMAX	Retail
214	Geratherm Medical AG	IAS	SMAX	Pharmaceuticals
215	Gerresheimer Glas AG	IAS	Unclassified	Consumer Cyclical
216	Hawesko Holding AG	IAS	SMAX	Food and Beverages
217	Heidelberger Zement AG	IAS	MDAX	Construction
218	HOCHTIEF AG	IAS	MDAX	Construction
219	Karstadt AG	IAS	MDAX	Retail
220	Kraftübertragungswerke Rheinfelden	IAS	Unclassified	Utilities
221	Loewe AG	IAS	MDAX	Telecommunications
222	Masterflex AG	IAS	SMAX	Industry
223	Medisana AG	IAS	SMAX	Pharmaceuticals
224	Merck KGaA	IAS	MDAX	Pharmaceuticals
225	MPC Capital AG	IAS	SMAX	Finance
226	MVV Energie AG	IAS	SMAX	Utilities
227	Puma AG	IAS	MDAX	Consumer Cyclical
228	Rational AG	IAS	SMAX	Telecommunications
229	Rhön Klinikum AG	IAS	MDAX	Pharmaceuticals
230	Salzgitter AG	IAS	MDAX	Machinary
231	Sanacorp Pharmahandel AG	IAS	SMAX	Pharmaceuticals
232	Sartorius AG	IAS	Unclassified	Telecommunications
233	Schmalbach-Lubeca AG	IAS	Unclassified	Industry
234	Südzucker AG	IAS	MDAX	Food and Beverages
235	TA Triumph-Adler AG	IAS	SMAX	Industry
236	Turbon AG	IAS	SMAX	Industry
237	Vivanco Gruppe AG	IAS	SMAX	Telecommunications
238	WashTec AG	IAS	SMAX	Machinary
239	WEDECO AG Water Technology	IAS	MDAX	Pharmaceuticals
240	Wella AG	IAS	MDAX	Pharmaceuticals
241	Wige Media AG	IAS	SMAX	Media
242	A.S. Creation Tapeten	IAS	SMAX	Consumer Cyclical
243	Adidas-Salomon AG	IAS	DAX	Consumer Cyclical
244	ADVorga	IAS	Unclassified	Industry

245	AG Kuehnle, Kopp & Kausch	IAS	Unclassified	Machinary
246	Barmag AG	IAS	Unclassified	Machinary
247	Bay .Motoren Werke AG (BMW AG)	IAS	DAX	Automobile
248	Bayer AG	IAS	DAX	Chemicals
249	Bertelmann AG	IAS	Unclassified	Media
250	Bremer Woll-Kammerei AG	IAS	Unclassified	Consumer Cyclical
251	Ceag AG	IAS	SMAX	Technology
252	Deutsche Post AG	IAS	DAX	Transportation
253	Dyckerhoff AG	IAS	MDAX	Construction
254	Escada AG	IAS	MDAX	Consumer Cyclical
255	Essanelle Hair Group AG	IAS	SMAX	Retail
256	Fraport AG Frankfurt Airport S W	IAS	MDAX	Transportation
257	GCI management AG	IAS	Unclassified	Industry
258	Henkel KGAA	IAS	DAX	Retail
259	Lufthansa AG	IAS	DAX	Transportation
260	MAN AG	IAS	DAX	Machinary
261	Metro AG	IAS	DAX	Retail
262	PREUSSAG AG	IAS	DAX	Transportation
263	Rheinmetall AG	IAS	MDAX	Machinary
264	RWE AG	IAS	DAX	Utilities
265	Schering AG	IAS	DAX	Pharmaceuticals
266	SCHOLZ & FRIENDS AG	IAS	Unclassified	Media
267	SGL Carbon AG	IAS	MDAX	Basic Resources
268	Softship AG	IAS	Unclassified	Software
269	Tarkett Sommer AG	IAS	SMAX	Construction
270	TRIPLAN AG	IAS	SMAX	Industry
271	Uniprof Real Estate AG	IAS	Unclassified	Finance
272	VOLKSWAGEN AG ST	IAS	DAX	Automobile
273	Cargolifter AG	US GAAP	MDAX	Transportation
274	Celanese AG	US GAAP	MDAX	Chemicals
275	Continental AG	US GAAP	MDAX	Automobile
276	Data Modul AG	US GAAP	SMAX	Telecommunications
277	Debitel AG	US GAAP	Unclassified	Telecommunications
278	Dürr AG	US GAAP	MDAX	Machinary
279	FAG Kugelfischer Georg Schäfer AG	US GAAP	Unclassified	Machinary
280	Jungheinrich AG	US GAAP	MDAX	Machinary
281	Knorr Capital Partner AG	US GAAP	SMAX	Finance
282	Marseille-Kliniken AG	US GAAP	SMAX	Pharmaceuticals
283	mg technologies AG	US GAAP	MDAX	Industry
284	Schwarz Pharma AG	US GAAP	MDAX	Pharmaceuticals
285	Techem AG	US GAAP	MDAX	Industry
286	VCL Medien	US GAAP	Unclassified	Media
287	Vossloh AG	US GAAP	MDAX	Telecommunications
288	Zapf Creation AG	US GAAP	MDAX	Consumer Cyclical
289	Daimler Chrysler AG	US GAAP	DAX	Automobile
290	E.ON AG	US GAAP	DAX	Utilities
291	EPCOS AG	US GAAP	DAX	Telecommunications
292	Hoechst	US GAAP	Unclassified	Pharmaceuticals
293	SAP AG	US GAAP	DAX	Software
294	Siemens AG	US GAAP	DAX	Telecommunications
295	ThyssenKrupp AG	US GAAP	DAX	Basic Resources

10.2 Appendix 2: Neuer Markt companies included in the study

No	Company	GAAP	Sector
1	aap-Implantate AG	IAS	Pharmaceuticals
2	Abit AG	IAS	Software
3	AC-Service AG	IAS	Software
4	Advanced photonics 25	IAS	Technology
5	Advanced Medien AG	IAS	Media
6	Allgeier Computer AG	IAS	Software
7	AmaTech AG	IAS	Technology
8	Antwerpes AG	IAS	Software
9	Articon Information Systems AG	IAS	Software
10	Arxes Information Design AG	IAS	Software
11	Balda AG	IAS	Technology
12	Bertrandt AG	IAS	Automobile
13	Bintec CommunicationAG	IAS	Technology
14	Biotissue Technologies AG	IAS	Pharmaceuticals
15	BOV AG	IAS	Software
16	Broadnet AG	IAS	Software
17	BRAIN International AG	IAS	Software
18	Cancom IT Systeme AG	IAS	Software
19	CDV Software Entertainment AG	IAS	Media
20	ce Conusmer	IAS	Technology
21	Cenit AG Systemhaus	IAS	Software
22	Centrotec Hochleistungskunststoffe AG	IAS	Pharmaceuticals
23	CineMedia Film AG	IAS	Media
24	Comtrade AG	IAS	Software
25	Constantin Film AG	IAS	Media
26	Cor Insurance Techn. AG	IAS	Software
27	Curasan AG	IAS	Pharmaceuticals
28	Ceyoniq AG	IAS	Software
29	Das Werk AG	IAS	Media
30	Datasave AG	IAS	Software
31	DEAG Deutsche Entertainment AG	IAS	Media
32	Drillisch AG	IAS	Telecommunication
33	Dr. Honle AG	IAS	Technology
34	D+s online AG	IAS	Software
35	E-M-S New Media AG	IAS	Media
36	Easy Software AG	IAS	Software
37	EMPRISE AG	IAS	Software
38	EM.TV & Merchandising AG	IAS	Media
39	Energiekontor AG	IAS	Technology
40	Euromed AG	IAS	Pharmaceuticals
41	e.multi Digitale Dienste AG	IAS	Software
42	FJA AG	IAS	Software
43	fluxx.com	IAS	Software
44	Fortec AG	IAS	Technology
45	Freenet.de	IAS	Software
46	Funkwerk AG	IAS	Telecommunication
47	F.A.M.E. Film Music Entertainment AG	IAS	Media
48	Gedys Internet Products AG	IAS	Software

49	GFT Technologies AG	IAS	Software
50	Grenke Leasing AG	IAS	Industry
51	GFN AG	IAS	Software
52	Haitec AG	IAS	Software
53	Helcon Media AG	IAS	Media
54	Höft und Wessel	IAS	Technology
55	Hunzinger Information AG	IAS	Industry
56	I.M internationalmedia AG	IAS	Media
57	Infor AG	IAS	Software
58	Intertainment AG	IAS	Media
59	IntraWare AG	IAS	Software
60	ISRA Vision Systems AG	IAS	Technology
61	IVU Traffic	IAS	Software
62	I:FAO AG	IAS	Software
63	Jetter AG	IAS	Technology
64	Linos AG	IAS	Technology
65	Lintec Computer AG	IAS	Technology
66	LPKF Laser & Electronics AG	IAS	Technology
67	Mania Technologie AG	IAS	Technology
68	Maxdata AG	IAS	Technology
69	Media! AG	IAS	Media
70	media[netCom] AG	IAS	Media
71	Medion AG	IAS	Technology
72	Mensch und Maschine Software AG	IAS	Software
73	Microlog Logistics AG	IAS	Transportation
74	MIS AG	IAS	Software
75	MME Me, Myself & Eye Entertainment AG	IAS	Media
76	MobilCom AG	IAS	Telecommunication
77	Mosaic Software AG	IAS	Software
78	MWG Biotech AG	IAS	Pharmaceuticals
79	m+s Elektronik	IAS	Software
80	4MBO International Electronic AG	IAS	Technology
81	Nemetschek AG	IAS	Software
82	Nexus AG	IAS	Software
83	Norcom Information Technology AG	IAS	Software
84	Novasoft AG	IAS	Software
85	November AG	IAS	Pharmaceuticals
86	NSE Software AG	IAS	Software
87	Nordex AG	IAS	Technology
88	Odeon Film AG	IAS	Media
89	ORBIS AG	IAS	Software
90	OHB Technology AG	IAS	Transportation
91	Paragon AG	IAS	Technology
92	PC-Spezialist	IAS	Technology
93	PC-Ware Information Technologies AG	IAS	Software
94	pgam advanced technologies AG	IAS	Automobile
95	Pixelnet AG	IAS	Software
96	Plambeck Neue Energien AG	IAS	Technology
97	Pro DV Software AG	IAS	Software
98	Prout AG	IAS	Software
99	P&I Personal & Informatik AG	IAS	Software

100	P&T Technology AG	IAS	Technology
101	Repower 834	IAS	Utilities
102	Rösch AG	IAS	Pharmaceuticals
103	RTV AG	IAS	Media
104	Sachsenring Automobiltechnik AG	IAS	Automobile
105	Saltus Technology AG	IAS	Industry
106	Senator Film AG	IAS	Media
107	SHS	IAS	Software
108	Silicon Sensor	IAS	Technology
109	Softing AG	IAS	Technology
110	SoftM AG	IAS	Software
111	Splendid Medien	IAS	Media
112	SZ Testsysteme AG	IAS	Technology
113	Sunways AG	IAS	Technology
114	Technotrans AG	IAS	Technology
115	Tiptel AG	IAS	Telecommunication
116	Tomorrow Focus AG	IAS	Software
117	Transtec AG	IAS	Technology
118	Tria Software AG	IAS	Software
119	Trius AG	IAS	Telecommunication
120	TTL Information Technology AG	IAS	Software
121	TV-Loonland AG	IAS	Media
122	UMS United Medical Systems International AG	IAS	Pharmaceuticals
123	United Labels AG	IAS	Media
124	Umweltkontor AG	IAS	Technology
125	Utimaco AG	IAS	Software
126	Vectron	IAS	Software
127	Viva Media AG	IAS	Media
128	Wapme Systems AG	IAS	Software
129	WWL Internet	IAS	Software
130	Winter AG	IAS	Technology
131	Computerlinks AG	IAS	Software
132	Secunet Security Networks AG	IAS	Software
133	Adori AG	IAS	Software
134	Jumptic	IAS	Software
135	ACG advanced Component	US GAAP	Technology
136	adva AG	US GAAP	Technology
137	AIXTRON AG	US GAAP	Technology
138	Alphaform AG	US GAAP	Industry
139	Analytik Jena AG	US GAAP	Technology
140	ARBO media.net	US GAAP	Media
141	Artnet.com	US GAAP	Software
142	Atoss Software AG	US GAAP	Software
143	Augusta Technologie AG	US GAAP	Technology
144	ABACHO	US GAAP	Software
145	Bäurer AG	US GAAP	Software
146	Basler 116	US GAAP	Technology
147	Bechtle AG	US GAAP	Software
148	Beta Systems AG	US GAAP	Software
149	BKN International AG	US GAAP	Software

150	buch AG	US GAAP	Retail
151	Caatoosee AG	US GAAP	Software
152	Ceotronics AG	US GAAP	Technology
153	Computec Media AG	US GAAP	Media
154	CPU Softwarehouse AG	US GAAP	Software
155	CTS Eventim AG	US GAAP	Media
156	co.don AG	US GAAP	Pharmaceuticals
157	CyBio AG	US GAAP	Pharmaceuticals
158	Cycos AG	US GAAP	Telecommunication
159	DataDesign AG	US GAAP	Software
160	DCI Database	US GAAP	Software
161	Digital Advertising AG	US GAAP	Software
162	D.Logistics AG	US GAAP	Transportation
163	Eckert und Ziegler AG	US GAAP	Pharmaceuticals
164	Elmos Semiconductor AG	US GAAP	Technology
165	EVOTEC BioSystems AG	US GAAP	Pharmaceuticals
166	Foris AG	US GAAP	Financial Services
167	Farmatic biotech energy ag	US GAAP	Technology
168	GAP AG	US GAAP	Technology
169	Gauss Interprise AG	US GAAP	Software
170	GeneScan Europe AG	US GAAP	Pharmaceuticals
171	Girindus AG	US GAAP	Pharmaceuticals
172	GPC-Biotech AG	US GAAP	Pharmaceuticals
173	Heiler Software AG	US GAAP	Software
174	IBS AG	US GAAP	Software
175	ID-Media AG	US GAAP	Software
176	IDS Scheer AG	US GAAP	Software
177	In-Motion AG	US GAAP	Media
178	Infogenie Europe AG	US GAAP	Telecommunication
179	init innovation AG	US GAAP	Technology
180	Internolix AG	US GAAP	Software
181	Intershop AG	US GAAP	Software
182	IPC Archtec AG	US GAAP	Technology
183	itelligence AG	US GAAP	Software
184	IXOS Software AG	US GAAP	Software
185	Jack White Productions AG	US GAAP	Media
186	Kleindienst AG	US GAAP	Software
187	Kontron Embedded Computers AG	US GAAP	Technology
188	LION Bioscience AG	US GAAP	Pharmaceuticals
189	Lipro Holding AG	US GAAP	Software
190	Lobster Technology Holding AG	US GAAP	Technology
191	Micrologica AG	US GAAP	Software
192	Morphosys AG	US GAAP	Pharmaceuticals
193	Mühlbauer Holding AG & Co	US GAAP	Technology
194	Muller-Die lila Logistik AG	US GAAP	Transportation
195	Net AG	US GAAP	Technology
196	Netlife AG	US GAAP	Software
197	Neue Sentimental AG	US GAAP	Media
198	OnVista AG	US GAAP	Software
199	Parsytec AG	US GAAP	Software
200	Pfeiffer Vacuum Technology AG	US GAAP	Industry

201	Pironet AG	US GAAP	Software
202	Pixelpark AG	US GAAP	Software
203	PlasmaSelect AG	US GAAP	Pharmaceuticals
204	Plenum AG	US GAAP	Software
205	Primacom AG	US GAAP	Telecommunication
206	PSB AG	US GAAP	Software
207	PSI AG	US GAAP	Software
208	Pulsion Medical Systems AG	US GAAP	Pharmaceuticals
209	QS Communications AG	US GAAP	Software
210	Realtech AG	US GAAP	Software
211	Rücker AG	US GAAP	Automobile
212	Singulus Technologies AG	US GAAP	Technology
213	SinnerSchrader AG	US GAAP	Software
214	Softline AG	US GAAP	Software
215	Softmatic	US GAAP	Software
216	Steag-Hamatech AG	US GAAP	Technology
217	Süss MicroTec	US GAAP	Technology
218	Swing 978	US GAAP	Media
219	Syskoplan AG	US GAAP	Software
220	Syzygy AG	US GAAP	Software
221	TDS AG	US GAAP	Software
222	Teles AG	US GAAP	Software
223	Travel24.com AG	US GAAP	Software
224	UBAG Unternehmer Beteilig....	US GAAP	Industry
225	United Internet AG	US GAAP	Software
226	USU-Openshop AG	US GAAP	Software
227	3 U Telecom	US GAAP	Telecommunication
228	Varetis AG	US GAAP	Telecommunication
229	Wavelight Laser Technologie AG	US GAAP	Pharmaceuticals
230	Web.de AG	US GAAP	Software
231	W.E.T. Automotive AG	US GAAP	Automobile
232	W.O.M World of Medicine AG	US GAAP	Pharmaceuticals
233	Carl Zeiss AG	US GAAP	Technology
234	Camelot tele.communication.online AG	US GAAP	Telecommunication
235	Lambda Physik AG	US GAAP	Technology
236	PVA TePla	US GAAP	Technology
237	Texas Instruments Berlin AG	US GAAP	Software
238	Telegate AG	US GAAP	Telecommunication
239	Biolitec AG	US GAAP	Pharmaceuticals
240	b.i.s. Börsen-Informations-Systeme AG	US GAAP	Software
241	MediGene AG	US GAAP	Pharmaceuticals
242	USU AG	US GAAP	Software
243	SAP systems	US GAAP	Software
244	EuroMicron AG	US GAAP	Technology

10.3 Appendix 3: German companies listed abroad as on December 31, 2001

Firm	Listings	Segment
B.U.S	NYSE (OTC)	SMAX
BASF	SwX[409], London, Paris, NYSE and Tokyo	DAX
Bayer	SwX, London, Paris, NYSE, Tokyo, Luxembourg, Madrid, Amsterdam, Antwerp, Barcelona, Brussels and Milan.	DAX
BMW	SwX	DAX
Bewag	Amsterdam	Unclassified
Celanese	NYSE	MDAX
Continental	SwX, London, NYSE (OTC)	MDAX
Daimler Chrysler	SwX, Paris, NYSE, Tokyo, Toronto, San- Francisco and Philadelphia	DAX
Deutsche Telekom	NYSE, Tokyo, Amsterdam and Toronto	DAX
Dyckerhoff	Luxemburg	MDAX
E.ON	SwX and NYSE	DAX
EPCOS	NYSE	DAX
Fresenius Medical care	NYSE	MDAX
Fuchs Petrolub AG	SwX	SMAX
Heidelberger Zement	Brussels	MDAX
Henkel AG	SwX and Vienna	DAX
Infineon Technologies	NYSE	Unclassified
IWKA	SwX	MDAX
iXOS	NASDAQ	Neuer Markt
Kraft...Rheinfeiden [410]	SwX	Unclassified
Linde	SwX	DAX
Lion Bioscience	NASDAQ	Neuer Markt
MAN AG	SwX and Vienna	DAX
Merck KGaA	SwX	MDAX
Metro AG	SwX	DAX
Pfeiffer Vacum	NYSE	Neuer Markt
Primacom	NASDAQ	Neuer Markt
QsC	NASDAQ	Neuer Markt
RWE	SwX	DAX
SAP AG	SwX	DAX
Schering	SwX, London and NYSE	DAX
SGL Carbon	NYSE	MDAX
Siemens	SwX, London, Paris, NYSE, Amsterdam, Brussels and Vienna	DAX
ThyssenKrupp	London	DAX
Volkswagen	London, Paris, Tokyo, Luxemburg, Madrid, Amsterdam, Brussels, Milan and Vienna.	DAX

[409] Schweitzer Börse
[410] Kraftuebertragungswerke Rheinfeiden

10.4 Appendix 4: German companies listed in the US as on December 31, 2001

Company	GAAP	Market
Companies listed on NYSE		
Allianz AG	IAS	Main
Altana AG	IAS	Main
BASF AG	GGAAP	Main
Bayer AG	IAS	Main
Celanese AG	US GAAP	Main
Daimler Chrysler AG	US GAAP	Main
Deutsche Bank AG	G GAAP	Main
Deutsch Telecom AG	G GAAP	Main
E.ON AG	US GAAP	Main
EPCOS AG	US GAAP	Main
Fresenius AG	G GAAP	Main
Infineon Technologies AG	US GAAP	Main
Pfeiffer Vacuum Technology AG	US GAAP	Neuer
SAP AG	US GAAP	Main
Schering AG	IAS	Main
SGL Carbon	IAS	Main
Siemens AG	US GAAP	Main
Companies listed on NASDAQ:		
Digital Telekabel AG		No information
Incam AG		Freiverkehr (OTC)
INTERSHOP Communications AG	US GAAP	Neuer
iXOS Software AG	US GAAP	Neuer
LION bioscience Aktiengesellschaft	US GAAP	Neuer

10.5 Appendix 5: A sample of multivariable models for the Main Market (other than the adopted one):

The following are only a sample of alternative multivariable models that show different combinations of variables other than that in the adopted model in Chapter 7. These models contain some of the variables excluded from the Main model, such as other size variables (in their continuous form), having foreign subsidiaries (FORSUB) and listing status (LIST).

Model 10.5.1:
A model including total assets (ASSETS) and management ownership (MAN1) as continuous variable

	B	S.E.	Wald	Sig.	Exp(B)	95.0% C.I.for EXP(B)	
SEGMENT	1.422	0.326	19.054	0.000	4.147	2.190	7.855
AUDID	0.842	0.303	7.714	0.005	2.321	1.281	4.205
FORMAN	0.679	0.307	4.910	0.027	1.972	1.082	3.597
ASSETS	0.019	0.012	2.808	0.094	1.020	0.997	1.043
MAN1	1.011	0.722	1.961	0.161	2.749	0.668	11.315
FORSUB	0.610	0.420	2.109	0.146	1.841	0.808	4.197
Constant	-3.241	0.506	41.061	0.000	0.039		

Model 10.5.2:
Including turnover (TURNOV) as a continuous variable (instead of ASSETS) and USSUB (having a subsidiary in the US)

	B	S.E.	Wald	Sig.	Exp(B)	95.0% C.I.for EXP(B)	
SEGMENT	1.153	0.337	11.692	0.001	3.169	1.636	6.138
AUDITOR	0.626	0.316	3.933	0.047	1.871	1.007	3.474
FORMANG	0.499	0.321	2.412	0.120	1.646	0.878	3.089
MAN1	1.564	0.747	4.385	0.036	4.776	1.105	20.639
FORSUB	0.006	0.467	0.000	0.990	1.006	0.402	2.513
TURNOV	0.063	0.027	5.430	0.020	1.065	1.010	1.123
USSUB	1.041	0.349	8.911	0.003	2.833	1.430	5.613
Constant	-3.043	0.504	36.393	0.000	0.048		

Model 10.5.3:
Including listing status (LIST) and excluding size variables

	B	S.E.	Wald	Sig.	Exp(B)	95.0% C.I.for EXP(B)	
SEGMENT	1.305	0.331	15.518	0.000	3.689	1.927	7.062
AUDID	0.819	0.306	7.141	0.008	2.268	1.244	4.134
FORMAN	0.630	0.310	4.117	0.042	1.877	1.022	3.450
MAN1	1.119	0.723	2.399	0.121	3.063	0.743	12.630
FORSUB	0.551	0.421	1.710	0.191	1.734	0.760	3.958
LIST	1.392	0.491	8.029	0.005	4.025	1.536	10.545
Constant	-3.155	0.505	38.993	0.000	0.043		

Model 10.5.4:
Including a size variable (EMPNO) as a continuous variable with listing status (LIST in the same model)

	B	S.E.	Wald	Sig.	Exp(B)	95.0% C.I.for EXP(B)	
SEGMENT	1.225	0.333	13.532	0.000	3.406	1.773	6.543
AUDITOR	0.782	0.309	6.392	0.011	2.186	1.192	4.007
FORMAN	0.543	0.316	2.939	0.086	1.720	0.925	3.199
MAN1	1.286	0.722	3.173	0.075	3.617	0.879	14.884
FORSUB	0.501	0.422	1.410	0.235	1.650	0.722	3.770
LIST	0.702	0.563	1.556	0.212	2.018	0.670	6.081
EMPNO	0.014	0.007	3.924	0.048	1.014	1.000	1.028
Constant	-3.130	0.504	38.532	0.000	0.044		

Model 10.5.5:
Including foreign investors (FORINVES) with segmentation (SEGMENT) in one model.

	B	S.E.	Wald	Sig.	Exp(B)	95.0% C.I. EXP(B)	
SEGMENT	1.638	0.316	26.795	0.000	5.144	2.767	9.563
FORINVS	0.590	0.307	3.703	0.054	1.804	0.989	3.289
Constant	-2.078	0.302	47.230	0.000	0.125		

Model 10.5.6:
Including the industry variable (INDUS1), which consists of 5 categories: Utilities and Transportation (U&T), Manufacturing (MANUF), Pharmaceuticals and Chemicals (P & C), Technology (TECHNO), and Trading (TRADE- as a reference category)

	B	S.E.	Wald	Sig.	Exp(B)	95.0% C.I.for EXP(B)	
SEGMENT	1.515	0.331	20.944	0.000	4.548	2.377	8.701
AUDID	0.831	0.304	7.457	0.006	2.296	1.264	4.170
FORMAN	0.834	0.308	7.337	0.007	2.302	1.259	4.209
MAN1	0.911	0.730	1.555	0.212	2.487	0.594	10.409
ASSETS	0.016	0.011	2.024	0.155	1.016	0.994	1.038
INDUS1			6.275	0.180			
U & T	0.966	0.643	2.254	0.133	2.626	0.745	9.264
MANUF	-0.024	0.353	0.005	0.946	0.977	0.489	1.951
P & C	0.828	0.483	2.941	0.086	2.289	0.888	5.895
TECHNO	0.484	0.493	0.960	0.327	1.622	0.617	4.266
Constant	-3.026	0.461	43.063	0.000	0.049		

Model 10.5.7:
Including the industry variable (INDUS2). which consists of thee categories: Services (SERVICE), Manufacturing (MANUF) and Trading (TRADE- as a reference category)

	B	S.E.	Wald	Sig.	Exp(B)	95.0% C.I.for EXP(B)	
SEGMENT	1.578	0.329	23.065	0.000	4.848	2.545	9.232
AUDID	0.863	0.303	8.086	0.004	2.369	1.307	4.293
FORMAN	0.785	0.305	6.636	0.010	2.192	1.206	3.982
MAN1	0.873	0.720	1.470	0.225	2.394	0.584	9.818
ASSETS	0.017	0.011	2.204	0.138	1.017	0.995	1.040
INDUS2			4.083	0.130			
SERVICE	0.845	0.446	3.592	0.058	2.328	0.972	5.579
MANUF	0.124	0.334	0.138	0.710	1.132	0.588	2.181
Constant	-3.074	0.463	44.153	0.000	0.046		

Model 10.5.8:
A model with a different variable of segments (nominal one with four categories. rather than a binary variable). where Unclassified firms are set as a reference category.

	B	S.E.	Wald	Sig.	Exp(B)	95.0% C.I. EXP(B)	
AUDITOR	0.904	0.314	8.254	0.004	2.468	1.333	4.572
FORMANG	0.705	0.312	5.093	0.024	2.024	1.097	3.735
MAN1	1.366	0.737	3.438	0.064	3.920	0.925	16.608
SASSETS	0.002	0.011	0.030	0.862	1.002	0.981	1.023
SEGMENTS			3E+01	1E-07			
DAX	3.048	0.773	15.564	0.000	21.070	4.635	95.782
MDAX	2.017	0.387	27.129	0.000	7.512	3.517	16.044
SMAX	0.899	0.369	5.941	0.015	2.458	1.193	5.065
Constant	-2.833	0.400	50.248	0.000	0.059		

10.6 APPENDIX 10.6: Steps of backward elimination that result in the adopted model for the Main Market:

		B	S.E.	Wald	df	Sig.	Exp(B)	95.0% C.I.for EXP(B)	
								Lower	Upper
Step 1	LEVERAGE	-.469	.840	.312	1	.576	.625	.121	3.246
	PROFIT1	.295	1.066	.077	1	.782	1.344	.166	10.847
	FREFLOAT	-.535	.693	.597	1	.440	.585	.151	2.276
	FORSUB	.569	.444	1.638	1	.201	1.766	.739	4.218
	AUDITOR	.674	.322	4.370	1	.037	1.962	1.043	3.692
	LIST	.545	.620	.772	1	.380	1.724	.512	5.812
	FORINVES	.196	.397	.243	1	.622	1.216	.558	2.650
	FORMANG	.449	.370	1.477	1	.224	1.567	.759	3.234
	INDUS2[411]			2.877	2	.237			
	INDUS2(1)	.653	.491	1.767	1	.184	1.921	.734	5.031
	INDUS2(2)	-.073	.364	.040	1	.841	.930	.455	1.899
	BIMAN1	1.063	.586	3.294	1	.070	2.895	.919	9.126
	BIMAN2	-.308	.849	.131	1	.717	.735	.139	3.885
	BIMAN3	.285	.782	.133	1	.715	1.330	.287	6.157
	OREMPNO[412]			.608	2	.738			
	OREMPNO(1)	.797	1.025	.604	1	.437	2.219	.297	16.555
	OREMPNO(2)	.199	.467	.182	1	.670	1.220	.489	3.046
	ORASSET			2.360	2	.307			
	ORASSET(1)	1.455	.967	2.264	1	.132	4.285	.644	28.518
	ORASSET(2)	.570	.567	1.012	1	.314	1.769	.582	5.375
	ORTURN			.173	2	.917			
	ORTURN(1)	-.047	1.226	.001	1	.969	.954	.086	10.546
	ORTURN(2)	-.253	.658	.148	1	.700	.776	.214	2.820
	PROFIT2	.016	.076	.042	1	.837	1.016	.876	1.178
	SEGMENT	1.248	.409	9.300	1	.002	3.483	1.562	7.767
	Constant	-3.359	.747	20.214	1	.000	.035		
Step 2	LEVERAGE	-.488	.838	.339	1	.560	.614	.119	3.170
	PROFIT1	.273	1.060	.066	1	.797	1.314	.165	10.501
	FREFLOAT	-.520	.690	.567	1	.451	.595	.154	2.301
	FORSUB	.556	.443	1.578	1	.209	1.744	.732	4.154
	AUDITOR	.668	.321	4.341	1	.037	1.950	1.040	3.655
	LIST	.556	.619	.808	1	.369	1.744	.519	5.863
	FORINVES	.199	.397	.250	1	.617	1.220	.560	2.656
	FORMANG	.453	.369	1.511	1	.219	1.573	.764	3.240
	INDUS2			2.842	2	.241			
	INDUS2(1)	.635	.488	1.693	1	.193	1.888	.725	4.915
	INDUS2(2)	-.082	.363	.051	1	.821	.921	.453	1.875
	BIMAN1	1.091	.582	3.521	1	.061	2.979	.953	9.314
	BIMAN2	-.309	.849	.132	1	.716	.734	.139	3.881
	BIMAN3	.284	.782	.132	1	.716	1.329	.287	6.157
	OREMPNO			1.023	2	.600			
	OREMPNO(1)	.813	.815	.994	1	.319	2.255	.456	11.147
	OREMPNO(2)	.129	.416	.096	1	.757	1.138	.503	2.572

[411] Recall that this the industry variable which includes three categories of which 1 is SERVICES, 2 is MANUF, while 3 is TRADE the reference category.

[412] This variable and the following two are the categorised size variables (OREMPNO, ORASSET and ORTUNOV). The category 1 is High, whereas 2 is Medium (law is the reference category)

	ORASSET			3.797	2	.150			
	ORASSET(1)	1.420	.730	3.782	1	.052	4.136	.989	17.294
	ORASSET(2)	.426	.423	1.015	1	.314	1.531	.668	3.506
	PROFIT2	.016	.076	.046	1	.830	1.016	.876	1.179
	SEGMENT	1.221	.402	9.231	1	.002	3.389	1.542	7.448
	Constant	-3.338	.743	20.190	1	.000	.036		
Step 3	LEVERAGE	-.471	.835	.318	1	.573	.624	.122	3.207
	PROFIT1	.405	.894	.205	1	.650	1.499	.260	8.643
	FREFLOAT	-.513	.690	.552	1	.457	.599	.155	2.315
	FORSUB	.552	.443	1.553	1	.213	1.736	.729	4.132
	AUDITOR	.672	.320	4.407	1	.036	1.958	1.046	3.665
	LIST	.556	.619	.807	1	.369	1.743	.518	5.864
	FORINVES	.201	.397	.257	1	.612	1.223	.562	2.662
	FORMANG	.456	.369	1.529	1	.216	1.577	.766	3.248
	INDUS2			2.909	2	.234			
	INDUS2(1)	.646	.486	1.767	1	.184	1.909	.736	4.950
	INDUS2(2)	-.077	.362	.045	1	.832	.926	.455	1.883
	BIMAN1	1.088	.582	3.502	1	.061	2.969	.950	9.281
	BIMAN2	-.307	.849	.130	1	.718	.736	.139	3.887
	BIMAN3	.284	.782	.132	1	.717	1.328	.287	6.152
	OREMPNO			1.027	2	.598			
	OREMPNO(1)	.815	.816	.998	1	.318	2.259	.457	11.172
	OREMPNO(2)	.129	.416	.097	1	.756	1.138	.503	2.574
	ORASSET			3.778	2	.151			
	ORASSET(1)	1.416	.730	3.764	1	.052	4.119	.986	17.216
	ORASSET(2)	.423	.423	1.002	1	.317	1.527	.667	3.495
	SEGMENT	1.216	.401	9.173	1	.002	3.373	1.536	7.408
	Constant	-3.354	.741	20.487	1	.000	.035		
Step 4	LEVERAGE	-.477	.835	.327	1	.568	.621	.121	3.188
	PROFIT1	.406	.894	.207	1	.649	1.501	.260	8.654
	FREFLOAT	-.517	.689	.564	1	.453	.596	.155	2.300
	FORSUB	.557	.442	1.587	1	.208	1.745	.734	4.152
	AUDITOR	.679	.319	4.530	1	.033	1.973	1.055	3.689
	LIST	.555	.618	.808	1	.369	1.743	.519	5.847
	FORINVES	.202	.397	.259	1	.611	1.224	.563	2.662
	FORMANG	.448	.368	1.488	1	.222	1.566	.762	3.219
	INDUS2			3.102	2	.212			
	INDUS2(1)	.671	.481	1.946	1	.163	1.957	.762	5.027
	INDUS2(2)	-.069	.361	.036	1	.849	.933	.460	1.893
	BIMAN1	1.007	.532	3.589	1	.058	2.738	.966	7.763
	BIMAN3	.060	.485	.016	1	.901	1.062	.411	2.747
	OREMPNO			1.095	2	.578			
	OREMPNO(1)	.842	.812	1.074	1	.300	2.320	.472	11.392
	OREMPNO(2)	.143	.415	.119	1	.730	1.154	.512	2.600
	ORASSET			3.673	2	.159			
	ORASSET(1)	1.386	.725	3.660	1	.056	4.001	.967	16.558
	ORASSET(2)	.415	.422	.967	1	.326	1.515	.662	3.466
	SEGMENT	1.222	.402	9.251	1	.002	3.393	1.544	7.456
	Constant	-3.369	.740	20.716	1	.000	.034		
Step 5	LEVERAGE	-.472	.834	.320	1	.572	.624	.122	3.198
	PROFIT1	.410	.893	.211	1	.646	1.507	.262	8.684
	FREFLOAT	-.536	.672	.637	1	.425	.585	.157	2.183
	FORSUB	.559	.442	1.597	1	.206	1.748	.735	4.157
	AUDITOR	.677	.319	4.513	1	.034	1.968	1.054	3.676

	LIST	.556	.618	.809	1	.368	1.743	.519	5.850
	FORINVES	.192	.388	.244	1	.621	1.211	.567	2.589
	FORMANG	.450	.367	1.502	1	.220	1.569	.764	3.223
	INDUS2			3.143	2	.208			
	INDUS2(1)	.674	.481	1.964	1	.161	1.962	.764	5.037
	INDUS2(2)	-.070	.361	.038	1	.846	.932	.460	1.890
	BIMAN1	1.052	.391	7.249	1	.007	2.864	1.331	6.162
	OREMPNO			1.088	2	.580			
	OREMPNO(1)	.839	.811	1.069	1	.301	2.314	.472	11.354
	OREMPNO(2)	.146	.414	.124	1	.724	1.157	.514	2.602
	ORASSET			3.658	2	.161			
	ORASSET(1)	1.381	.723	3.645	1	.056	3.978	.964	16.413
	ORASSET(2)	.413	.421	.958	1	.328	1.511	.661	3.451
	SEGMENT	1.228	.399	9.488	1	.002	3.414	1.563	7.457
	Constant	-3.351	.726	21.323	1	.000	.035		
Step 6	LEVERAGE	-.600	.787	.581	1	.446	.549	.117	2.567
	FREFLOAT	-.552	.672	.675	1	.411	.576	.154	2.148
	FORSUB	.546	.441	1.535	1	.215	1.726	.728	4.095
	AUDITOR	.669	.318	4.419	1	.036	1.951	1.046	3.639
	LIST	.546	.617	.782	1	.377	1.726	.515	5.783
	FORINVES	.192	.388	.245	1	.621	1.211	.567	2.590
	FORMANG	.456	.367	1.539	1	.215	1.577	.768	3.239
	INDUS2			3.021	2	.221			
	INDUS2(1)	.663	.480	1.912	1	.167	1.941	.758	4.970
	INDUS2(2)	-.061	.360	.028	1	.866	.941	.465	1.905
	BIMAN1	1.034	.389	7.051	1	.008	2.812	1.311	6.032
	OREMPNO			1.117	2	.572			
	OREMPNO(1)	.852	.811	1.104	1	.293	2.344	.478	11.483
	OREMPNO(2)	.157	.413	.145	1	.704	1.170	.521	2.631
	ORASSET			3.706	2	.157			
	ORASSET(1)	1.388	.723	3.683	1	.055	4.009	.971	16.551
	ORASSET(2)	.428	.421	1.034	1	.309	1.535	.672	3.503
	SEGMENT	1.241	.398	9.718	1	.002	3.458	1.585	7.542
	Constant	-3.282	.707	21.565	1	.000	.038		
Step 7	LEVERAGE	-.596	.786	.575	1	.448	.551	.118	2.573
	FREFLOAT	-.561	.670	.701	1	.402	.571	.154	2.121
	FORSUB	.515	.436	1.397	1	.237	1.674	.713	3.931
	AUDITOR	.677	.317	4.563	1	.033	1.969	1.057	3.666
	LIST	.559	.616	.825	1	.364	1.750	.523	5.851
	FORMANG	.537	.328	2.671	1	.102	1.711	.899	3.256
	INDUS2			2.949	2	.229			
	INDUS2(1)	.648	.479	1.828	1	.176	1.911	.747	4.889
	INDUS2(2)	-.070	.359	.038	1	.846	.933	.461	1.885
	BIMAN1	1.040	.389	7.138	1	.008	2.830	1.319	6.069
	OREMPNO			1.206	2	.547			
	OREMPNO(1)	.883	.810	1.189	1	.276	2.419	.494	11.840
	OREMPNO(2)	.159	.414	.147	1	.701	1.172	.521	2.637
	ORASSET			3.619	2	.164			
	ORASSET(1)	1.369	.723	3.591	1	.058	3.933	.954	16.213
	ORASSET(2)	.430	.421	1.046	1	.306	1.538	.674	3.510
	SEGMENT	1.205	.390	9.568	1	.002	3.337	1.555	7.160
	Constant	-3.207	.689	21.691	1	.000	.040		
Step 8	LEVERAGE	-.486	.776	.392	1	.531	.615	.134	2.817
	FREFLOAT	-.566	.665	.724	1	.395	.568	.154	2.091

	FORSUB	.545	.435	1.573	1	.210	1.725	.736	4.042
	AUDITOR	.670	.316	4.482	1	.034	1.954	1.051	3.634
	LIST	.684	.597	1.314	1	.252	1.982	.615	6.381
	FORMANG	.545	.326	2.799	1	.094	1.725	.911	3.269
	INDUS2			2.840	2	.242			
	INDUS2(1)	.645	.478	1.824	1	.177	1.907	.747	4.863
	INDUS2(2)	-.052	.356	.021	1	.884	.949	.472	1.909
	BIMAN1	1.020	.386	6.983	1	.008	2.772	1.301	5.906
	ORASSET			14.152	2	.001			
	ORASSET(1)	1.918	.512	14.045	1	.000	6.806	2.496	18.555
	ORASSET(2)	.507	.377	1.812	1	.178	1.661	.793	3.476
	SEGMENT	1.240	.384	10.402	1	.001	3.456	1.627	7.342
	Constant	-3.279	.688	22.740	1	.000	.038		
Step 9	FREFLOAT	-.601	.662	.822	1	.365	.548	.150	2.009
	FORSUB	.537	.433	1.540	1	.215	1.712	.732	4.001
	AUDITOR	.665	.316	4.435	1	.035	1.945	1.047	3.613
	LIST	.707	.596	1.410	1	.235	2.028	.631	6.518
	FORMANG	.529	.325	2.652	1	.103	1.697	.898	3.208
	INDUS2			3.028	2	.220			
	INDUS2(1)	.690	.473	2.128	1	.145	1.993	.789	5.036
	INDUS2(2)	-.021	.353	.003	1	.954	.980	.491	1.957
	BIMAN1	.998	.384	6.773	1	.009	2.714	1.280	5.757
	ORASSET			14.258	2	.001			
	ORASSET(1)	1.925	.512	14.135	1	.000	6.858	2.513	18.711
	ORASSET(2)	.501	.376	1.774	1	.183	1.650	.790	3.447
	SEGMENT	1.231	.383	10.339	1	.001	3.426	1.617	7.256
	Constant	-3.491	.601	33.708	1	.000	.030		
Step 10	FORSUB	.525	.433	1.471	1	.225	1.690	.724	3.948
	AUDITOR	.666	.315	4.466	1	.035	1.947	1.049	3.611
	LIST	.568	.576	.973	1	.324	1.764	.571	5.452
	FORMANG	.528	.324	2.662	1	.103	1.696	.899	3.200
	INDUS2			2.652	2	.266			
	INDUS2(1)	.625	.466	1.798	1	.180	1.868	.749	4.658
	INDUS2(2)	-.038	.351	.012	1	.914	.963	.484	1.916
	BIMAN1	.944	.377	6.291	1	.012	2.572	1.229	5.379
	ORASSET			14.298	2	.001			
	ORASSET(1)	1.930	.512	14.213	1	.000	6.891	2.526	18.799
	ORASSET(2)	.516	.374	1.900	1	.168	1.675	.804	3.490
	SEGMENT	1.112	.357	9.691	1	.002	3.041	1.510	6.125
	Constant	-3.562	.592	36.242	1	.000	.028		
Step 11	FORSUB	.540	.434	1.550	1	.213	1.716	.734	4.014
	AUDITOR	.686	.314	4.771	1	.029	1.986	1.073	3.675
	FORMANG	.567	.321	3.129	1	.077	1.763	.941	3.305
	INDUS2			2.657	2	.265			
	INDUS2(1)	.647	.466	1.932	1	.165	1.911	.767	4.760
	INDUS2(2)	-.008	.349	.001	1	.982	.992	.500	1.967
	BIMAN1	.920	.375	6.011	1	.014	2.510	1.203	5.240
	ORASSET			20.888	2	.000			
	ORASSET(1)	2.132	.471	20.449	1	.000	8.428	3.346	21.229
	ORASSET(2)	.538	.374	2.071	1	.150	1.712	.823	3.560
	SEGMENT	1.179	.353	11.145	1	.001	3.250	1.627	6.494
	Constant	-3.643	.590	38.164	1	.000	.026		
Step 12	FORSUB	.571	.429	1.772	1	.183	1.769	.764	4.099
	AUDITOR	.685	.314	4.766	1	.029	1.984	1.073	3.669

	FORMANG	.544	.319	2.908	1	.088	1.723	.922	3.221
	BIMAN1	.909	.372	5.971	1	.015	2.482	1.197	5.146
	ORASSET			22.226	2	.000			
	ORASSET(1)	2.186	.467	21.889	1	.000	8.898	3.561	22.232
	ORASSET(2)	.567	.369	2.358	1	.125	1.763	.855	3.636
	SEGMENT	1.102	.346	10.133	1	.001	3.011	1.527	5.936
	Constant	-3.520	.550	40.903	1	.000	.030		
Step 13	AUDITOR	.696	.312	4.963	1	.026	2.006	1.087	3.700
	FORMANG	.618	.314	3.855	1	.050	1.854	1.001	3.435
	BIMAN1	.819	.364	5.054	1	.025	2.268	1.111	4.632
	ORASSET			22.727	2	.000			
	ORASSET(1)	2.196	.465	22.308	1	.000	8.987	3.613	22.354
	ORASSET(2)	.557	.368	2.287	1	.130	1.745	.848	3.593
	SEGMENT	1.201	.339	12.518	1	.000	3.323	1.708	6.462
	Constant	-3.117	.445	49.083	1	.000	.044		

Variable(s) entered on step 1: LEVERAGE, PROFIT1, FREFLOAT, F_SUB, AUDITOR, L_S, FORINVS2, FORMANG, INDUS2, BIMAN1, BIMAN2, BIMAN3, OR3EMPNO, OR3ASSET, OR3TURN, PROFIT2, and SEGMENT.

10.7 Appendix 10.7: Steps of backward elimination that result in the adopted model for the Neuer Markt.

		B	S.E.	Wald	df	Sig.	Exp(B)	95.0% C.I.for EXP(B)	
								Lower	Upper
Step 1	SEMPNO	.022	.022	1.039	1	.308	1.023	.980	1.067
	LEVERAGE	-1.688	.848	3.958	1	.047	.185	.035	.975
	PROFIT1	-1.214	.438	7.678	1	.006	.297	.126	.701
	MAN3	-.334	.721	.214	1	.644	.716	.174	2.943
	FREFLOAT	-.055	.890	.004	1	.951	.947	.166	5.414
	AUDITOR	.906	.304	8.898	1	.003	2.474	1.364	4.487
	US_MAN	.779	.636	1.501	1	.220	2.179	.627	7.576
	USSUB	.659	.307	4.622	1	.032	1.934	1.060	3.527
	USINVS2	1.189	.816	2.120	1	.145	3.283	.663	16.260
	INDUS3			5.732	3	.125			
	INDUS3(1)	1.280	.690	3.445	1	.063	3.597	.931	13.899
	INDUS3(2)	.815	.547	2.220	1	.136	2.258	.773	6.593
	INDUS3(3)	1.238	.556	4.955	1	.026	3.448	1.159	10.254
	Constant	-1.795	.778	5.327	1	.021	.166		
Step 2	SEMPNO	.022	.022	1.067	1	.302	1.023	.980	1.067
	LEVERAGE	-1.691	.846	3.996	1	.046	.184	.035	.967
	PROFIT1	-1.214	.438	7.672	1	.006	.297	.126	.701
	MAN3	-.318	.672	.223	1	.637	.728	.195	2.718
	AUDITOR	.908	.303	8.989	1	.003	2.478	1.369	4.485
	US_MAN	.779	.636	1.503	1	.220	2.180	.627	7.576
	USSUB	.658	.306	4.627	1	.031	1.931	1.060	3.518
	USINVS2	1.194	.812	2.162	1	.141	3.300	.672	16.205
	INDUS3[413]			5.733	3	.125			
	INDUS3(1)	1.279	.690	3.440	1	.064	3.593	.930	13.878
	INDUS3(2)	.813	.546	2.215	1	.137	2.255	.773	6.581
	INDUS3(3)	1.236	.555	4.956	1	.026	3.441	1.159	10.211
	Constant	-1.822	.648	7.909	1	.005	.162		
Step 3	SEMPNO	.022	.022	1.039	1	.308	1.022	.980	1.067
	LEVERAGE	-1.745	.837	4.350	1	.037	.175	.034	.900
	PROFIT1	-1.253	.432	8.425	1	.004	.286	.123	.666
	AUDITOR	.928	.300	9.563	1	.002	2.528	1.404	4.552
	US_MAN	.768	.630	1.485	1	.223	2.156	.627	7.415
	USSUB	.660	.306	4.663	1	.031	1.935	1.063	3.523
	USINVS2	1.228	.805	2.324	1	.127	3.414	.704	16.552
	INDUS3			6.154	3	.104			
	INDUS3(1)	1.291	.689	3.510	1	.061	3.637	.942	14.039
	INDUS3(2)	.803	.548	2.147	1	.143	2.231	.763	6.527
	INDUS3(3)	1.262	.554	5.182	1	.023	3.532	1.192	10.469
	Constant	-1.930	.608	10.065	1	.002	.145		
Step 4	LEVERAGE	-1.446	.778	3.453	1	.063	.236	.051	1.082
	PROFIT1	-1.176	.423	7.727	1	.005	.309	.135	.707
	AUDITOR	.972	.297	10.748	1	.001	2.645	1.479	4.730
	US_MAN	.735	.626	1.377	1	.241	2.086	.611	7.120
	USSUB	.703	.303	5.393	1	.020	2.019	1.116	3.653

[413] Categories are= INDUS (1)=SOFTWARE, INDUS(2)=PHARMA, INUS(3)=OTHER, and INDUS(4)=MEDIA (reference category)

	USINVS2	1.205	.804	2.247	1	.134	3.336	.690	16.118
	INDUS3			6.813	3	.078			
	INDUS3(1)	1.317	.688	3.663	1	.056	3.733	.969	14.382
	INDUS3(2)	.892	.542	2.705	1	.100	2.439	.843	7.058
	INDUS3(3)	1.355	.548	6.107	1	.013	3.875	1.323	11.345
	Constant	-2.013	.605	11.055	1	.001	.134		
Step 5	LEVERAGE	-1.525	.774	3.884	1	.049	.218	.048	.992
	PROFIT1	-1.178	.419	7.917	1	.005	.308	.136	.700
	AUDITOR	.984	.296	11.071	1	.001	2.674	1.498	4.773
	USSUB	.774	.296	6.833	1	.009	2.168	1.214	3.873
	USINVS2	1.696	.689	6.068	1	.014	5.454	1.414	21.031
	INDUS3			6.795	3	.079			
	INDUS3(1)	1.335	.682	3.833	1	.050	3.800	.998	14.466
	INDUS3(2)	.844	.534	2.493	1	.114	2.325	.816	6.627
	INDUS3(3)	1.309	.539	5.896	1	.015	3.704	1.287	10.658
	Constant	-1.954	.596	10.749	1	.001	.142		

a Variable(s) entered on step 1: SEMPNO, LEVERAGE, PROFIT1, MAN3, FREFLOAT, AUDITOR, US_MAN, USSUB, USINVS2, INDUS3.

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